NATURE MAGAZINE

NOVEMBER 1924

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THE TREE PLANTING ARMY

Education in tree planting is one of the major courses the people of America must elect.
—Charles Lathrop Pack, President, American Tree Association.

Education Week coming November 17 will see thousands of new members in the tree-planting army. Friday of that week is the day set aside for discussion of forest, wild flower and game conservation. The American Tree Association is sending out tree-planting suggestions and tree-day programs to women's clubs, Scout organizations and American Legion posts. Saturday of Education Week is tree-planting day.

The first National Memorial Tree has been planted by the American Legion at St. Paul. During the national convention of the Legion the tree was placed on the grounds of the Minnesota capital at St. Paul.

At Cincinnati the Cincinnati Civic and Vocational Leagues are campaigning for tree planting. This organization is made up of civic clubs in the eighth grades and high schools of that city. Tree-planting suggestions and tree-day programs of the Association have also been sent to a hundred organizations in the Ohio city. Irene D. Cornwell is the director of the service department of this organization in the public schools.

As part of the Nature Study work in the Sacramento schools a tree-planting campaign is under way there at the direction of Florence G. Billig, assistant supervisor of science. Application has been made to the American Tree Association for 1,500 memberships for a starter. These tree planters will all be registered as members of the tree-planting army at Washington. These tree planters are in the junior high schools.

Every district chairman of conservation of the Kansas Federation of Women's Clubs has received reforestation data from the tree association. Mrs. Grace W. Wolf is directing the work from the Topeka headquarters. The Kansas women are planting trees and taking up the larger phases of reforestation in their club work, Mrs. Wolf reports.

The Prince of Wales planted a tree on Long Island to mark his visit to America. The prince planted a tree in Central Park, New York City, to mark his former visit. At this tree planting, the tree-planting army was represented by Mr. Pack.

Nebraska Club women plan to put that state in the front rank in the tree-planting army. This is the home state of J. Sterling Morton, the father of Arbor Day. Mrs. Alvin Spelts, state chairman of conservation, had a booth at the annual state meeting in which the tree-planting army's data was given out. The Association's information is now going to each district chairman in that state.

Mrs. Frank Hummel, chairman of conservation and thrift of the Iowa Society of the D. A. R., is in the midst of a tree-planting campaign in that state. There are 81 chapters in the state, and each is cooperating in getting new members for the tree-planting army.

The Federated Women's Clubs of Youngstown, Ohio, are to plant 250 memorial trees for the World War soldiers. Mrs. William Anderson is the secretary of the federation, and to her tree-day programs and tree-planting suggestions have been sent.

The biology department of the Louisville Girls' High School is going in for tree planting at the direction of Jessie E. Jones of that department. Through its garden clubs the grades in Louisville have been doing a great tree-planting work.

The first Women's Federation Forest has been started on a hundred-acre tract between Saratoga and Glens Falls, N. Y. The New York State Federation of Women's Clubs is behind the movement. With great ceremony the first 100 trees were planted by Boy Scouts, representatives of the women's clubs of Albany, sportsmen's organizations and business men. Mrs. E. C. Whitmyer, of Schenectady, chairman of conservation, was appointed to select the site. Mrs. C. J. Reeder, of Carthage, presented the land. Mrs. Lee P. Hynes organized the Albany women and the Boy Scouts for the tree-planting work. Mrs. Russell Headley officially represented the Albany Clubs, the committee for which was: Mrs. Charles N. Gilbert, Mrs. Newton Russell Cass, Mrs. Lemuel Holmes, 2d, Mrs. Leon Janinet, Mrs. Frederick Pruyn, Mrs. George W. Stedman, Mrs. Frederick J. Stephens. This is one of the most constructive pieces of reforestation work undertaken by women's clubs anywhere in the United States, and President Pack of the American Tree Association and Mrs. John D. Sherman, the new president of the General Federation of Women's Clubs, both express the hope that other state organizations follow the fine example set by New York women.

The only way to join the American Tree Association is to plant a tree and register it with the Association, 1214 Sixteenth Street N.W., Washington, D. C. The Association will send tree-planting suggestions and a tree-day program for two cents to pay postage. Make your fall tree-planting plans now.

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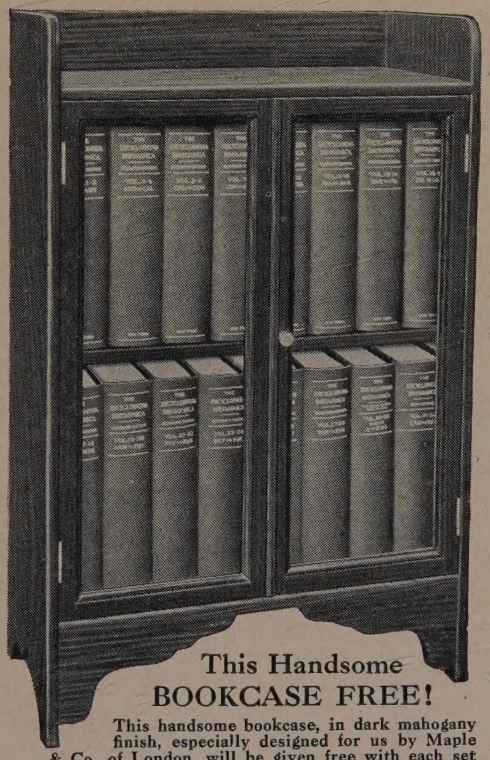

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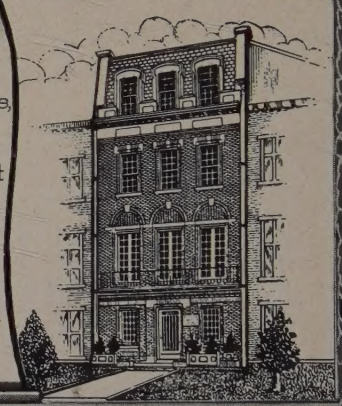

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November

Nature Calendar

NOVEMBER

November Night

Listen . . .
With faint dry sound,
Like steps of passing ghosts,
The leaves, frost-crisp'd, break from the trees
And fall. —*Adelaide Crapsey.*

With the falling of the leaves, the trees, like athletes stripped for the contests, are revealed in all their beauty. There is power and strength in the Oak, grace in the Elm, and symmetry in the Maple.

Trailing through a carpet of dried leaves on the ground you may find the Partridgeberry vine with its shining green leaves and bright red fruit.

The hardy Chrysanthemum brightens many a flower-forsaken garden corner.

Goldenrod and Asters often continue to bloom until late in the month.

Dandelions blooming by the roadside seize their last opportunity for propagation.

Conspicuous now is the pendant fruit of the Sycamore tree.

A suggestion of spring is in the smooth green expanse of Winter Wheat fields.

This is sowing time for many plants. Great diversity is shown in methods of seed distribution.

The traveler afield will soon become acquainted with the way Sticktights and Burdocks extend their kind to new fields.

November winds are transporting the balloon-like seeds of the Milkweed.

Kingfishers, Ducks, Geese, and Grebes move southward with the approach of winter's cold.

By now the Black Bear is well protected with a long heavy coat of fur and a thick layer of fat.

Privet shrubs, covered with small black berries, are among the last to succumb to winter's storms.

November skies show a propensity of gray and mauve.

With the absence of foliage, cocoons of our large silk-spinning moths (the Cecropia, Promethea, Luna, and Polyphemus) are more prominent.

The cocoons of the Luna and Polyphemus Moths drop to the ground and so are not seen as easily as are the other two.

On bright sunny days Midges and Dance-flies frolic in the air.

Cabbage Butterflies visit the few belated flowers that have escaped the frost.

Little beetles and other insects which have taken shelter in crevices and beneath leaves on the ground come forth when the weather is warm.

This is the end of the Grasshopper season, but now and then you may hear the coarse song of the Katydid or the soft, soothing notes of the Tree Cricket.

The bird-life of November is essentially the same as that of March. Similarity in the food supply of these two months is one of the reasons for this.

The slightest disturbance will cause a startling volley of Witch-hazel seeds to explode from their pods.

Prepared for NATURE MAGAZINE by the Cleveland Museum of Natural History

BROWN GLACIER WATERS RUSH DOWN TO JOIN THE SEA

NATURE MAGAZINE

Vol. IV NOVEMBER, 1924 No. 5

The difference between landscape and landscape is small, but there is great difference in the beholders.—EMERSON.

The Tale of the "Tusitala"

By ARTHUR N. PACK *and* ELEANOR PACK

Last July members of the Editorial Staff of Nature Magazine including William L. and Irene Finley, Arthur Newton and Eleanor Pack and others undertook an expedition, under the auspices of the American Nature Association, to a part of America as yet not widely known. This is the first of a series of stories of the wild life of the British Columbia coast as found and photographed by members of the expedition.

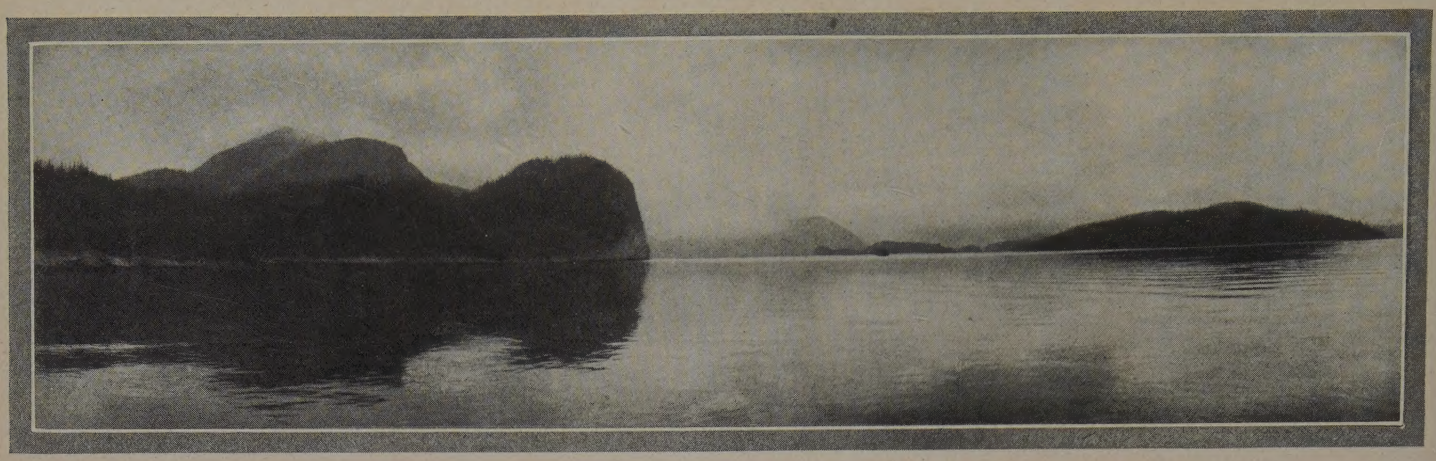
AMID THE inland salt water passageways of British Columbia, toppling mountains rise precipitously from the sea and great virgin forests still exist. Vast schools of salmon populate the narrow races of the tide and gather off the mouths of tumbling rivers, which they will later ascend to spawn and reproduce their kind. Precipitous rocks give shelter to colonies of sea gulls, pigeon guillemots and other water fowl. Tunneled banks conceal the burrows of otter and mink, and holes from which the crested Kingfisher darts forth with his rattling call to skim the surface of some hidden lagoon.

Every summer thousands of tourists traverse the principal inner channels of the British Columbia coast bound for Alaska, but from their comfortable chairs on deck they glimpse merely an unfolding panorama of still channels and distant peaks. One must take a smaller boat and be the captain of his own course. Even then he may not see, for the eyes of Nature are a gift which few of us have learned to use.

And so one day the motor yacht *Tusitala* slipped her cable from a float in Vancouver Harbor bound for ports unknown and carrying a cargo of vacant film and eager imaginations. "Tusitala" was the name which the natives of Samoa gave to Robert Louis Stevenson, for it means "the story teller," and the mission of this "Tusitala" was to make her dis-

THE "TUSITALA" SHIPPED HER CABLE FOR PORTS UNKNOWN

Into the inland salt water passages of British Columbia to discover its hidden wonders of Nature.



SOFT CLOUDS AND DARK SHADOWS WITH THE SETTING SUN

Bays, arms and inlets of the sea, like mountain lakes, beckon the explorer to discover their undiscovered treasures.

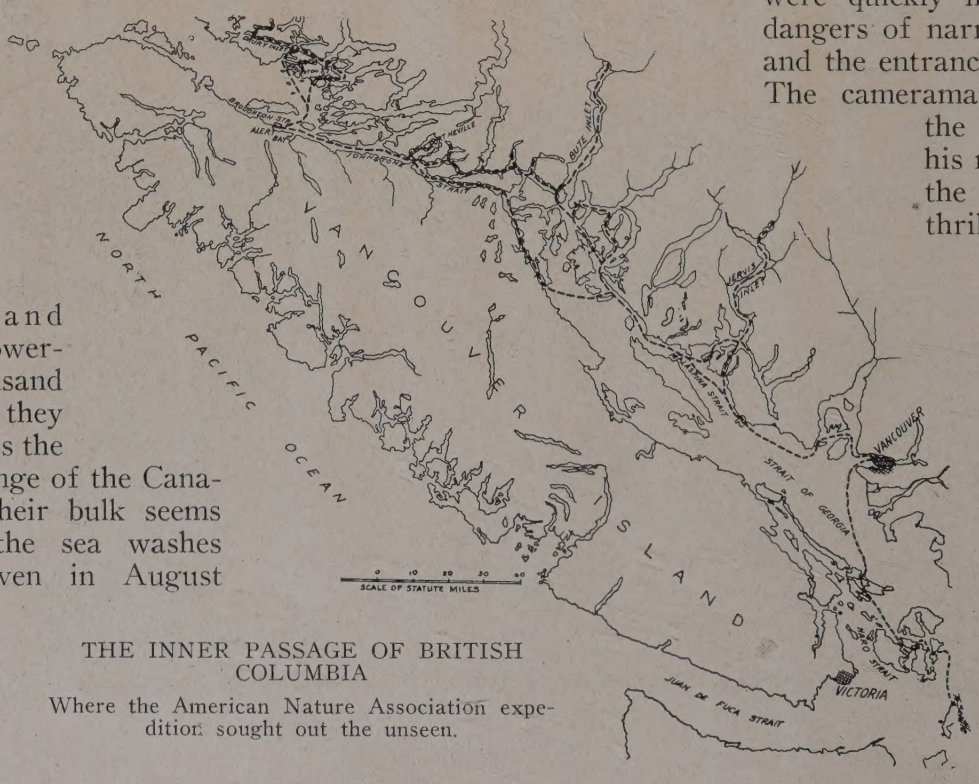
coveries and tell her tales to the readers of NATURE MAGAZINE.

The British Columbia coast is a strange and marvelous region. A great mountain range lies partly sunken beneath the sea, and the tides run through its valleys, long ago submerged. These mountains are part of the great western coastal range of our continent extending not north and south as many people imagine, but bending decidedly westward between Vancouver and Alaska. North of Vancouver no railroad or roadway has as yet broken through the barrier for many hundred miles, but several great arms of the sea extend inland for forty, sixty or eighty miles. There, in the primeval wilderness, great glacial rivers roar during July and August with the full strength of their flood and color the salt fjords with milky silt. Along these inlets, jagged mountain peaks rise higher and higher, some towering to eight thousand feet. Although they are not so high as the better known range of the Canadian Rockies, their bulk seems mightier, for the sea washes their feet. Even in August snow and ice tip every pinnacle, while blue-green glaciers hide aloft in the shelter of the unattained passes.

The heads of these inlets offer a grizzly paradise; mountain goats thrive in the green meadows just below the glaciers. One may occasionally see these animals apparently quite near at hand, but, alas for the hunter, were he to shoot his quarry, he might find the necessary climb to gain the meat beyond his powers. The high-powered rifle will carry far enough, but our official photographer met an insurmountable task.

As the nose of the *Tusitala* pointed northward, taking the waves as a hunter jumps his hurdles, there were strange things lying in store for those on board. We who had regarded the tide as a slow advance or recession of waves on a sandy beach were quickly initiated into the dangers of narrow passageways and the entrance to many inlets. The cameraman, enamored of the grandeur, with his movie perched on the bow, was after thrills.

"It would make a great picture," enthused the camera shooter to the captain, as we came up to the first narrows an hour before the slack. The waters were swirling and sucking in little whirlpools responding to the



THE INNER PASSAGE OF BRITISH COLUMBIA

Where the American Nature Association expedition sought out the unseen.

mighty force of accumulated pressure in wider, deeper spaces beyond. The *Tusitala* headed in, when suddenly a giant whirlpool formed and spun across her bow. As the yacht swung irresistibly from her course toward the rocks, the captain, with teeth tightly clamped on his pipe stem, whirled his wheel with all his strength, and the *Tusitala*, careening in an effort to compromise between the force of the water and the dictates of her helm, sped safely through.

"Tomorrow we hit the Yuculta Rapids," said the captain.

"Will she make a good picture?" queried the cameraman.

"We can't take any more risks." And on the morrow we understood.

We were anchored in a protected cove which the main rapids swept by. To reach this place we had entered the narrow channel of Yuculta Rapids, a passage carved out by nature, a turbulent outlet for two great arms of the sea. It was the middle of July when the longest tides of the year were running, and the difference between the ebb and flow was twenty-one feet. Great overfalls, two to three feet high, appeared in the very center of the channel and changed their direction with the tide. We stood upon a rocky bluff and looked down through the tops of the firs upon a green torrent like the rapids of Niagara, while all about us sounded the booming roar of a great flood. The Yucultas had come into their own and, except upon a few moments of slack, four times during the twenty-four hours, no boat of any kind dared run the race.

With these high tides of mid-summer, waves of herring come rolling in from the unknown depths of the ocean. As we sat looking down into the clear

THE LAGOON LASHED ITSELF INTO DENSE FOAM

The racing tide churned suds upon the water and the canoe slid through soft piles like miniature icebergs and floes.

salt water, a school of herring passed, fluttering like silvery leaves, but all of one accord and onward with an urgent purpose, for the big silvery salmon were in pursuit. Darting here and there in schools were the cohoes and the springs, for the cold, rapid waters of the Yucultas are the playgrounds for the runs of salmon that sweep in from the sea and on up high above tide waters to spawn. That evening, about slack tide, we pushed our canoe and rowboat overboard, for we were anchored near some of the best fishing grounds in British Columbia. As the shades of evening were falling we trailed along after a motley crew of followers of the sport and seekers after trade.

THE JELLYFISH FLOATED SPINELESSLY

The sea gave up many beauties for the film and for study.

Dark-visaged Siwash Indians troll from dugouts with heavy hand lines, expecting to sell their catch at the next stop of the cannery boat, and white settlers make their living in the same way. We caught our share of great silvery beauties ranging from six to eighteen pounds, and our share of dogfish and rock cod, thereby occasioning shouts of derisive laughter from those who were too wise to let their bait sink below the proper level. The associate editor returned triumphant with a twelve-pound fish which he had played for an hour, but failed to smuggle aboard the remains of one broken rod without inspiring comment.

A NOOK WHERE THE TIDE PLAYS

Three times a day it rushes in and surges out, playfully but powerfully.

On the morning following such an occasion the two gasoline engines of the *Tusitala* throbbed once more, and we sailed on westward, leaving behind the higher snow-clad peaks. A change became noticeable in the character of the forest growth along the shore, a change perhaps caused by the fogs drifting in from around the upper end of Vancouver Island. In this upper fog belt the Douglas fir, which has heretofore been the predominating tree, gives way to the red cedar, the mountains become lower, the land more swampy. We no longer saw waterfalls pitching down from steep cliffs, but still our ears detected here and there a roar, and our eyes discovered the white foam of what seemed some powerful river, boiling into the sea. These torrents, we soon found, were not rivers at all but narrow tidal outlets of salt lagoons separated from our channel by some rocky barrier. At high tide the salt water poured over this barrier into the lagoon in a beautiful overfall, gradually growing less and less as the lagoon filled, until the open passageway would admit a canoe or rowboat. Only for a few moments, however, was the passage clear, for even while the eye watched, the waters turned with the receding tide and poured back across the rock with ever-increasing violence, until an

MAKING FRIENDS WITH THE ASSOCIATE EDITOR

Shooting with cameras inspires friendship in the wild, and baby fawn finds it safe to be cute and curious.

overfall six or eight feet high would develop. The greater the variation between tides, the more spectacular was the effect and the more the brownish water from the lagoon lashed itself into dense foam which drifted hither and thither and gave the appearance of miniature icebergs and ice-floes.

About the entrance of these lagoons shy seals raised their small heads and gazed at us with limpid, cow-like eyes. The lagoons and still bays echoed to the cry of loons and the occasional squawking of a mother merganser as she steered her fluttering brood from the path of Mr. Finley's canoe. The raccoon who came at low tide to dig clams, the doe with her spotted fawn, and even the timber wolf who followed our steps unseen in the virgin forest, were all at home in their native wild. They knew little of man, but their natural instincts taught them to be wary of the unknown, and all of Mr. Finley's skill was sometimes insufficient to surprise them with the click of his camera shutter.

Miles of primeval forest. In this age of wood and paper such resources of mature timber act as a magnet irresistibly calling to the lumberman, and the commercial logger, like the commercial fisherman, had answered that call long before the *Tusitala* bore her party of lovers of wild life into the fastnesses of this wilderness. Scattered here and there along the coast we found not only fishing villages of the Indians and canneries of the white man but little shacks built upon rafts or floats of logs moored close to shores too rough to permit easy home-building on land. These rafts furnished us more than once a resting place for the night more simple and secure than anchoring in unknown waters.

At such times morning often found the naturalists down upon their hands and knees on the float, peering into the translucent depths to view a populous submarine city built beneath the old logs. Those were gorgeous cities rich in color and abounding in architecture such as man has never planned. Castles there were of many storied barnacles, from whose open windows one might catch a glimpse of the owner's thread-like feelers in continuous motion. Tall white monuments were built not of statuary marble but of the stalks of Sea Anemones floating their plumes until, at the touch

GREAT VIRGIN FORESTS STILL EXIST

Clothing the steep islands and peninsulas are glorious trees, where only here and there a hand logger has been at work.

of some goggle-eyed rock cod fish or other foreign object, they quickly withdrew into the stalk. Tortuous Serpula Worms, safely encased in their coats of hard, shell-like substance, likewise displayed flags of red and orange, which disappeared at a touch into the mouth of the tube. Then there were the

GLACIERS AND SNOWY PEAKS ENFOLDING

An unfolding panorama of beauty, seen from a tourist boat, but known only by those who venture in small craft.

streaming ribbons of kelp bursting from a brown ball at the end of a long brown tube. These tubes are often ten or twenty feet long and of such even size that the Siwash Indian children use them for skipping ropes.

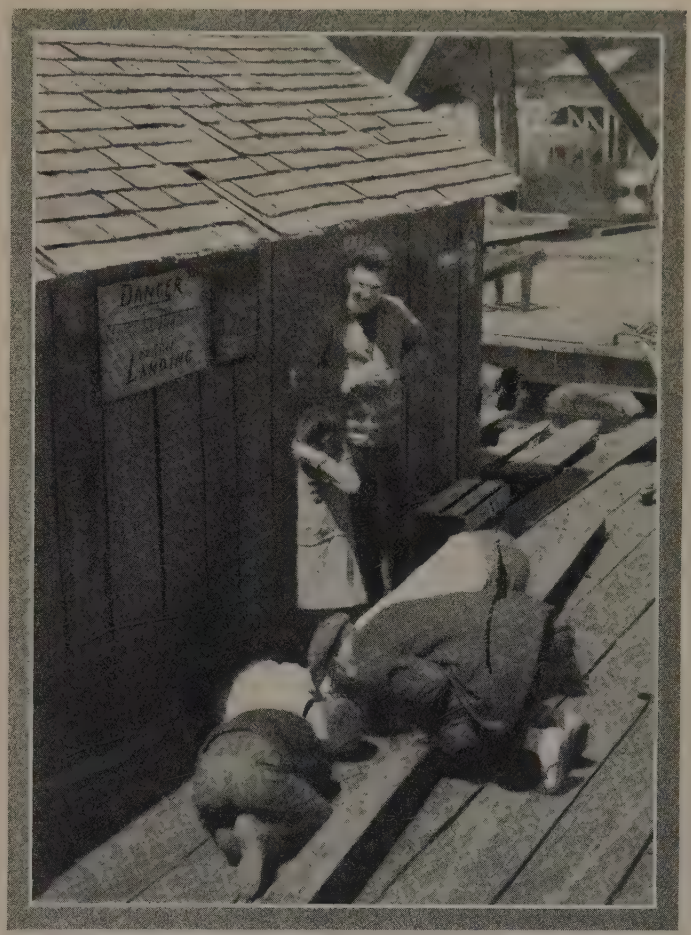
Nor were the streets of these submarine cities uninhabited. Up and down them

TOPPLING MOUNTAINS RISE FROM THE SEA

Tides ebb and swirl between great ranges over great valleys now sunk below the sea.

A SUN-FISH POSED FOR THE CAMERA

The Finleys filmed a gorgeous fellow with brilliant pinks and purples.



A POPULOUS SUBMARINE CITY BELOW

Inspecting translucent depths which boast architecture such as man has never planned.

swam innumerable jelly-fish, some almost colorless and only tinged with white, one or two with pale, coffee-colored bodies and orange and red tentacles. Mr. Finley fished among them with bare hands, so entranced was he with these strange Hydroids and other elementary forms of life. He told us how these living creatures form the first step in the theory of evolution, stopping now and again to hastily drop his subject when his pointing fingers came in contact with the stinging cells. Then, forgetful of so mundane an interruption, as every naturalist should be, down went his hand again to bring forth this time a green creature, called an Isopod, which fortunately for the lecturer lacked the back-biting ability of the eastern Helgramite, which its form resembled; or again it was a Sea-cucumber whose gorgeous, flowerlike tenacles, like those of the Anemones and Serpulid, promptly withdrew at a single touch. We learned that the Chinese along the coast prize this cold, sticky worm as a table delicacy.

In a little pool among the rocks, left by the receding tide, we made the acquaintance of a Hermit Crab who had evidently just outgrown his old home and backed into a Whelk-shell still several sizes too large. Mrs. Finley became the official collector of Starfish and "sun" Starfish, the former five-pointed, the latter often with innumerable rays. Every shade of orange, read and purple had been adopted by different members of the Starfish tribe.

So many a morning passed swiftly. Many an afternoon the *Tusitala* plodded along her course. Of an evening our canoe crept silently along the shore where every splash demanded explanation.

EDITOR'S NOTE: Further stories regarding the animal and bird life of the British Columbia coast as seen by members of the expedition will appear in the December number of NATURE MAGAZINE.

Jack Frost in the Orchard

By CHARLES FITZHUGH TALMAN
U. S. Weather Bureau

THE FRUIT-GROWERS of the United States pay heavy tribute every year to Jack Frost. The apple crop alone is damaged annually to the extent of forty million dollars, on an average, by his icy breath; and the orange and other citrus crops of Florida and California have, in certain years, been almost wiped out by his visitations. Yet Jack has a worse reputation than he deserves and is often accused of mischievous deeds when, in his blundering way, he is actually doing good. This happens almost every spring, when such trees as apples, pears, plums and cherries are in bloom. A frost plays havoc with the blossoms, and we hear that the crop has been ruined. The following autumn, however, we have more fruit and better fruit than we should have had if the frost had not occurred. This is because every fruit tree produces a great superabundance of blossoms. They do not all open at the same time, and, when open, are unequally exposed to the effects of frost on account of their different locations on the tree; hence a large proportion of them may be destroyed without curtailing the crop. Moreover, without the pruning action of frost, too many blossoms tend to set fruit

PHOTOGRAPH ROUND CREST ORCHARD HEATER COMPANY

AN ORCHARD NOCTURNE IN COLORADO

This fairy spectacle beneath the trees is an episode in the yearly campaign against the spring frosts.

and the vitality of the tree is exhausted. Orchardists tell us that from 75 to 90 per cent of the blossoms should be destroyed by frost to give the best results. The frosts that do harm are, as a rule, those that occur after the period of full bloom is over, and the later the frost the greater the damage.

What is a frost? In its broadest sense, the word "frost" denotes any occurrence of freezing temperature, i.e., 32° Fahrenheit or lower. The "great frosts" of which we read in British literature—such as those that have furnished the occasion for "frost fairs" on the frozen surface of the Thames—are periods of exceptionally cold weather in winter. In this country we speak of such periods as "cold spells" rather than frosts, and their onset is generally described as a "cold wave." The term "frost" is also applied, in both England and America, to a deposit of frozen moisture, otherwise known as "hoar frost."

While fruit trees are sometimes "winter-killed" by low winter temperatures, and may also suffer in spring or autumn from the effects of a general "freeze," occurring by night or day, the frosts with which fruit-growers are chiefly concerned occur only at night or in the early morning and are more or less local in character. They are due to the chilling of the ground in calm weather by radiation to a clear sky, and the consequent cooling of the lower air. At higher levels the air remains relatively warm, so that the normal decrease of temperature with increase of altitude gives place to the reverse condition, known to meteorologists as a "temperature inversion." This effect is often so pronounced that frost will nip the lower branches of a tree while the upper remain untouched.

PHOTO U. S. DEPT. OF AGRICULTURE

FIGHTING FROST WITH A SMOKE SCREEN

Once a popular method of protection now fallen into disrepute.

Cold air is heavier than warm, and on a night of frost it forms stagnant pools in spots of low ground. Such places are the "frost pockets" or "North Poles" of a fruit-growing district, and are bad locations for orchards. Broad hilltops may also become very cold at night on account of excessive radiation. Generally speaking, frost is least severe on hillsides, though on a southern slope, owing to its precocious vegetation, a spring frost of given intensity is likely to do more damage than elsewhere. The comparative immunity of hillsides from frost is strikingly exemplified in the so-called "ther-

PHOTO U. S. WEATHER BUREAU

NOT A KU KLUX KLAN KONCLAVE

Merely oil-burning orchard heaters protecting trees in Medford, Oregon, from frost.

mal belts" found in many mountainous regions. The most famous of these favored zones are in the mountains of North Carolina. Writing of this region in the agricultural report of the patent office for 1861, Silas McDowell says:

"The beautiful phenomenon of the 'Verdant Zone' or 'Thermal Belt' exhibits itself upon our mountain sides, commencing about three hundred feet vertical height above the valleys and traversing them in a perfectly horizontal line throughout their entire length like a vast green ribbon upon a black ground. Its breadth is four hundred feet vertical height, and from that wider, according to the degree of the angle with the plane of the horizon. Vegetation of all kinds within the limits of this zone is untouched by frost; and such is its protective influence that the Isabella, the most tender of all our native grapes, has not failed to produce abundant crops in twenty-six consecutive years; nor has fruit of any kind ever been known within these limits to be frost-killed, though there have been instances where it has been so from a severe freeze."

PHOTOGRAPH U. S. BUREAU OF AGRICULTURE ECONOMICS

AFTER THE FREEZE

A lemon tree heavily pruned after the sudden cold had nipped it.

Many studies of thermal belts have been made since McDowell's time, including a very elaborate one carried out a few years ago by Professor Cox, of the Weather Bureau, and, though the description quoted above should not be taken too literally, it gives a substantially correct idea of an interesting natural phenomenon. One of the last letters written by the poet Sidney Lanier, before his death in 1881, was addressed to President Gilman, of Johns Hopkins University, requesting the loan of meteorological instruments with which to investigate the "no frost belt" on the side of Tryon Mountain, near Asheville.

The prevalence of frost depends partly on topography, but to a greater extent upon geography. Latitude, altitude above sea-level, prevailing winds, distance from large bodies of water and other factors controlling climate in general determine the average dates of occurrence of the last destructive frost in spring and the first in autumn, which mark the beginning and end of the "growing season," and, together with soil and rainfall, indicate what varieties of fruit and other crops can be grown successfully in a particular region. Statistics of both average and exceptional dates of these events have been compiled from the records of more than 5,000 weather stations in the United States and published in various government documents. The in-

PHOTOGRAPH U. S. WEATHER BUREAU

TOLL OF THE TINGLING FROSTY NIGHT

Frozen oranges, now only good to be plowed in as fertilizer.

formation is presented in the form of charts in the "Atlas of American Agriculture," Part II, Section I (Washington, 1918). From these sources we learn that no part of the country is absolutely exempt from frost except certain of the Florida Keys.

PHOTOGRAPH BY FORD R. CARPENTER

A LEMON GROVE PROTECTED AGAINST FROST

Expensive cloth covering over five acres of young trees to check the loss of heat by night.

Frost is practically sure to occur every year in all parts of the country except the southern half of Florida, a narrow zone along the Gulf coast and certain favored districts of Arizona and California. Over the greater part of the country, where vegetation is dormant in winter, the frosts that do damage occur in the spring and fall. In the far south the frost season is in winter, and the injury is done mainly to mature fruit rather than buds or blossoms, though occasionally a freeze of exceptional severity kills much or all of the wood above ground of the subtropical varieties of fruit trees. In the far North and in mountainous regions elsewhere frosts not infrequently occur in midsummer.

Nowadays the fruit-grower's main recourse against Jack Frost is "orchard-heating." Warming the air out of doors by artificial means in order to protect orchards from frost would seem, at first sight, far too expensive a process to be undertaken. It should be remembered, however, that when the ordinary night frost occurs only a shallow layer of air near the ground is cold enough to do damage to vegetation, and therefore the amount of air that needs to be heated in order to keep the temperature of the orchard above the danger point is relatively small. If a breeze springs up during a night of frost the mere mixing of the warmer and colder layers of the atmosphere generally suffices to raise the temperature of the lower air above freezing. This fact has led to the invention of various air-mixing machines, consisting of powerful fans, some of which have been tried on a rather extensive scale in the citrus groves of California. They "work," but not well enough to justify the cost of operation.

The modern process of orchard-heating is often called "smudging," though it is really a great improvement upon the old-fashioned process to which that term is correctly applied. A "smudge," properly so called, is an artificial cloud in the form of a dense blanket of smoke, and its use as a means of preventing frost undoubtedly arose from the observation that frost does not occur on cloudy nights. Smudges have been used from remote antiquity. Pliny mentions them (though his conception of frost injury was considerably mixed up with notions concerning the noxious influences of the heavenly bodies), and they are also said to have been employed by the natives of Peru as far

PHOTOGRAPH U. S. WEATHER BUREAU

LATH SHELTER TO PROTECT A LEMON NURSERY

This cover breaks the fall of temperature at night and fire pots on the ground do the rest.

back as the days of the Incas. Their use was recommended by a French authority of the sixteenth century. Toward the end of the eighteenth century there was a law in certain parts of Germany requiring the burning of smudge fires when conditions favored frost, and inspectors were appointed to see that the law was carried out.

The primary purpose of smudging is not to add heat to the air, but to prevent the loss of heat that normally occurs after sundown in clear, still weather. Garden truck and other small crops can be protected from frost by covers of cloth or other material, and screens of various kinds have occasionally been erected over full-grown trees and even whole orchards for the same purpose, but generally the only practicable cover for an orchard is a blanket of smoke. A smudge is designed not only to prevent excessive chilling of vegetation by night but also to prevent rapid warming after sunrise. It is generally believed that the harmful effects of a frost can be offset to a large extent if the frozen vegetation is allowed to thaw out gradually, though the advantages of slow "defrosting" have been the subject of a good deal of controversy.

PHOTOGRAPH U. S. BUREAU OF AGRICULTURE ECONOMICS

VICTIM OF A SUDDEN FROST

Most of the leaves and much of the wood of this orange tree are dead.

One objection to smudging is that even a light breeze carries the smoke away from the orchard, and another is that the soot is a nuisance in various ways. Moreover, fruit-growers have learned by their own observations, confirmed by scientific experiments, that the heat of the smudge fires is a much more important factor in frost protection than the smoke. Thus from bonfires and smudge-pots have been developed the modern types of orchard-heater, some of which produce very little smoke, and all of which are designed primarily for heating.

Some heaters are constructed for burning coal, but the favorite fuel, particularly in California, where orchard-heating is much more extensively practiced than elsewhere, is a cheap grade of crude oil. From 80 to 120 heaters are used to the acre, and they are lighted very rapidly when needed by means of gasoline torches. Automatic lighters have been used with some success.

The practice of orchard-heating is now thoroughly systematized and is nearly always carried on in connection with cooperative arrangements for the prompt distribution of frost warnings. The Weather Bureau has taken an active part in these arrangements and maintains a special "fruit-frost service" in many fruit-growing districts. The general conditions favoring the occurrence of frost can be gathered from the weather map, but frost is usually so local in character that special forecasts must be made for each district. These are based in part upon observations of the temperature and humidity of the air in the afternoon. Various formulas have been worked out connecting such observations with the lowest temperature likely to occur during the night. Another important consideration is the relation between the lowest temperature occurring at a so-called "key station" and those that occur at various points in the surrounding country. The relation is fairly constant and is determined by means of temperature surveys carried on for several successive seasons. Tested thermometers are installed in large

WILL it be a green Christmas or will the hills and valleys be clothed in white? How often we hear this question! In the Christmas number of "Nature Magazine" Charles Fitzhugh Talman will have another of his entertaining weather articles. Its title will be "Snow," and it will make your Xmas white regardless of what the weather man does.

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IT'S A WISE CHILD THAT KNOWS ITS OWN FATHER

Why the 'Possum Thrives

By JOSEPH W. LIPPINCOTT

THROUGH a remarkable ability to bluff—to "play 'possum"—this strange animal is actually holding its own while so many other wild creatures are fast losing ground in the remaining wild places.

This is interesting as well as surprising. In the first place, the opossum is the sole survivor in North America of the ancient race of comparatively unintelligent creatures known as marsupials—animals which carried their young after birth in a pouch or pocket. In the second place, it is much sought after both for its handsome fur and for food. In most states it is not, like other fur-bearers, protected by any laws; indeed, because of its fondness for chicken it is generally regarded by the farmer as an enemy which, like vermin, should be destroyed whenever found. How, therefore, can this slow creature manage to survive?

When I was a boy I once caught a large 'possum in a box trap. I found him fast asleep in one end of the box on a cozy bed of leaves he had pulled in through the cracks. No fright, no wild temper; he simply looked up when disturbed, yawned and tried to go to sleep again. Except that he was heavy, there was no difficulty in carrying him home by his tail and penning him in a rabbit hutch. He went to sleep there in complete contentment as if it had always been his home. But in the morning he was gone! He had gnawed a hole in a rotten board.

The second 'possum I caught acted in much the same way. I put her in a strong wire coop. That night, after eating all the food I left for her, she ripped a way through the wire and escaped. My third and fourth 'possums escaped. After thirty some years they still escape from me and no doubt always will.

The truth of the matter is that the apparently stupid, slow, almost helpless animal you find is

playing 'possum all of the time. He makes you undervalue his capabilities. In reality he is very powerful, a great climber, and a good digger. His teeth, backed by the strength in his long jaws, can break ordinary woven wire or rip wood into pieces.

ON MOTHER'S BACK

The baby 'possums know the mother can carry them best when they ride on her shoulders.

And lastly, the spirit of the wild is so strong in him that he will never give up the idea of escape. This spirit seems born in him. Even the young raised in captivity have it to such an extent that they will chew and dig night after night and sooner or later win freedom.

The 'possum is not troubled with "nerves." A mink, a squirrel or even a fox will go almost crazy when captured and overlook possible avenues of escape. Not so the 'possum! He quietly examines every inch of his prison, finds the weakest place, and then sets to work. As long as it remains a tradition that the real 'possum hunter always brings back his game alive, we need have no fears for the 'possum.

In the night woods an old 'possum rarely has anything to fear except traps and dogs. He can whip a cat, he can often bluff a coon out of a den, the fox avoids him, and the bloodthirsty weasel knows that his neck is too thick for its teeth to penetrate. Bobcats may get a few half-grown ones, but bobcats are scarce indeed and, anyway, can find more palatable game. But the dog is a problem.

Somehow the wise old male 'possums soon learn what dogs of the neighborhood to fear. They will stand and fight the smaller ones, showing great courage at times. If, however, the display of a mouthful of sharp teeth and a rumbling growl suggesting a much larger animal do not impress a dog, the average 'possum invariably plays dead. He lies there stiff and still with mouth open, eyes glassy. His pose does not suggest that it is studied, but his body is actually so arranged that a dog's teeth can scarcely reach a vital spot. Thick fur, tough hide and rolls of fat offer glorious chewing to the masterful cur, but that is all. The wise 'possum is usually more tickled than hurt and suggests this by a broad grin. A dog, especially if he has hound blood, enjoys a chase or a fight. He sees no sport in mauling an unresisting dead thing and soon loses interest and leaves the 'possum, whereupon that worthy waits just long enough for the way to a tree or nearby drain to be safe and then comes to life. He is a good gauger of distance, too, and isn't caught a second time.

The females and the small 'possums usually keep close to fence rows or the edges of woods in their travels, so that they can get off the dangerous ground if a dog surprises them. If given time, they will select a good big tree in which to hide, but if rushed they will climb anything. A man climbing after one will have to follow to the very tip top twig and then pull the 'possum out. Shaking him out is

BABY 'POSSUMS

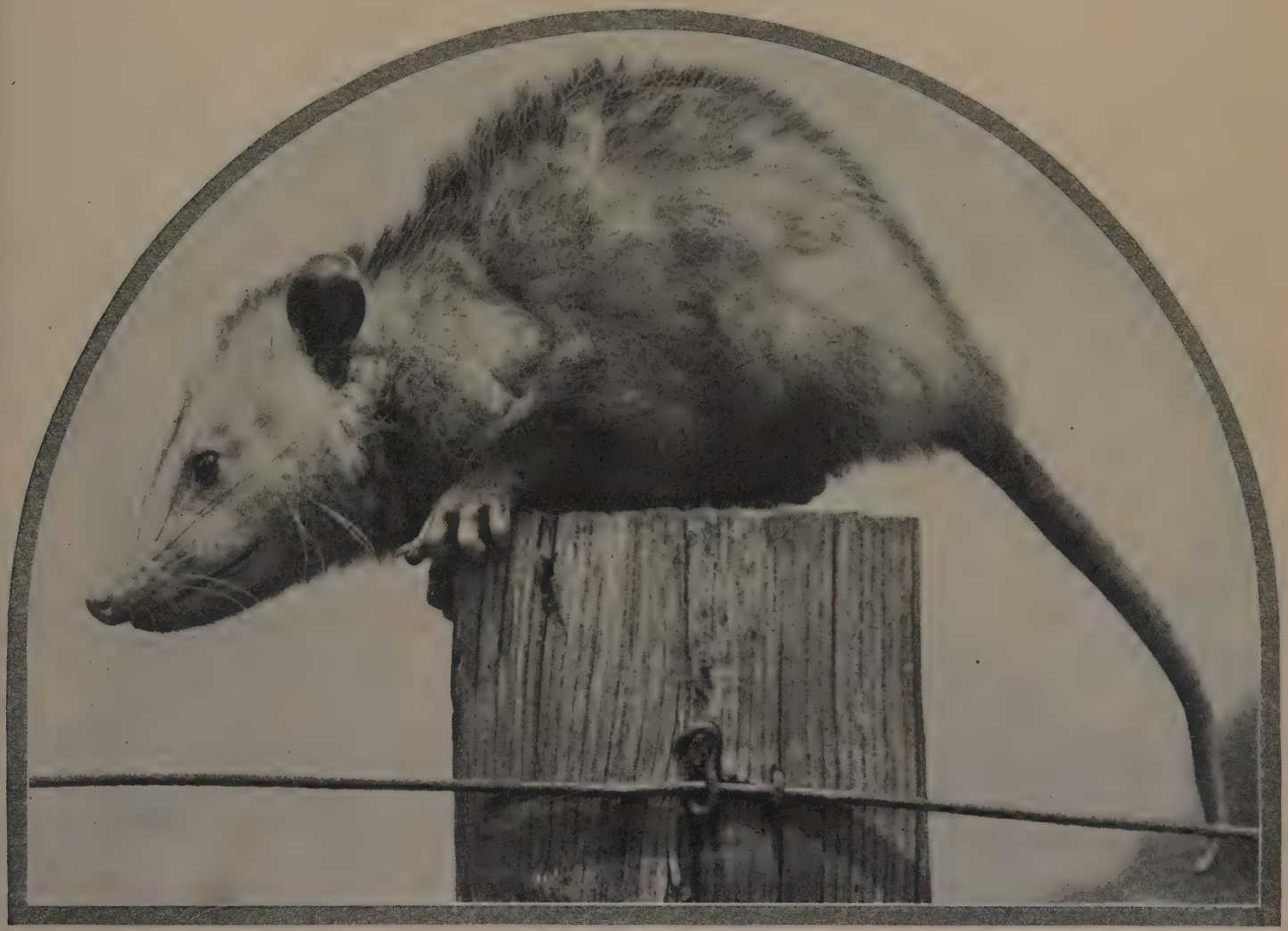
These, when full grown, may weigh ten pounds each, and be as large as cats.

difficult because he holds on with eighteen toenails, a tail and fifty teeth.

In the choice of a den, he shows great wisdom. First of all, it must be near the main food supply, so that he does not have to make long trips; when the food supply shifts, the den is changed with it. He chooses odd places where one does not think of hunting for him. He may make a bed under the hen house or stable, on top of a haymow or stack, in a dry drain, or even under the front porch of a

house. Any place where he will not be disturbed is home to him.

I have found them in the high crotches of trees, in the summer nests of the gray squirrel, in hen coops, and even curled up under bushes. Always the bed was made comfortable with plenty of grass, moss or leaves. The bedding, however, is not carried in the 'possum's mouth in the manner of the squirrel. If he has to carry it up to a hollow in a tree top, he wraps his tail around a bundle and hauls it up behind him with surprisingly little effort.

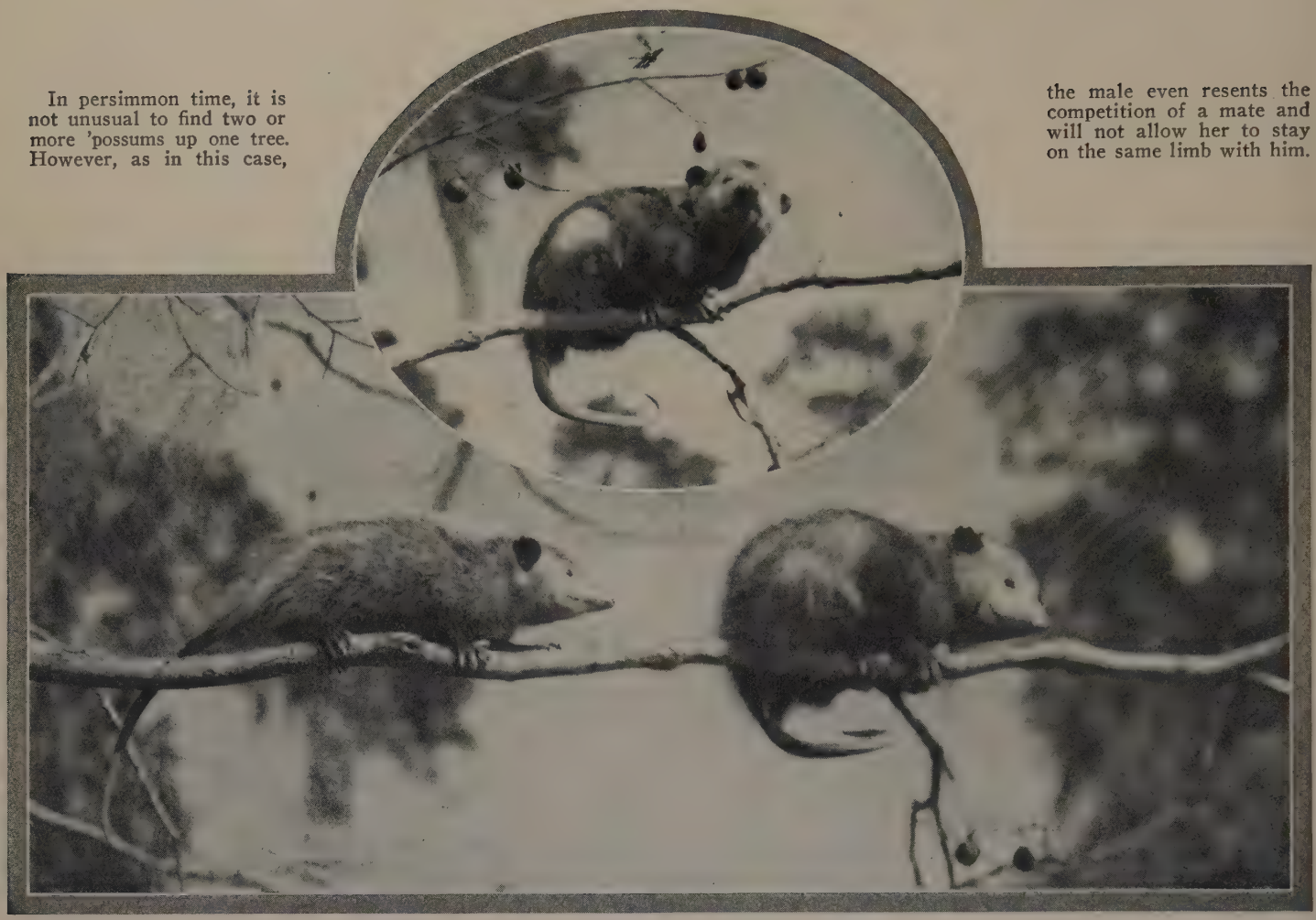


A CLOSE-UP OF MR. 'POSSUM

The 'possum likes to travel near trees or along a fence, so that he can climb to safety if overtaken by a dog. This fat old 'possum was photographed in summer when the fur is not so thick as later in the year.

In the matter of food he is easily pleased. I remember one 'possum that lived for about a year under the floor of a pigsty and ate at night from the pigs' trough. Near habitations the 'possums soon locate any slops and become adepts at opening slop cans. Tying down the tin lids does no good. In the woods they dig up roots, eat mushrooms and nonpoisonous toadstoods, all kinds of berries, fruits and thin-shelled nuts, mice, birds' eggs, frogs, toads, worms, large insects, etc. Any dead animal is quickly located and eaten. In the far South the 'possums help the buzzards in clearing the country of the pigs that die from cholera and the cattle that each winter starve in the woods or die from disease.

The 'possum is, however, not naturally a scavenger. He knows all about the woods and finds the first ripe persimmon and the last frozen crab apple. In early autumn he locates the ripening sweet acorns and climbs for them almost as soon as the squirrels, who have a slight advantage because they cut nuts green and store them until ripe, a thing which is not attempted by the 'possum. But, like the squirrels and some birds, he is a tree planter. The gray squirrel buries nuts and seed-filled pine cones where they will probably grow into trees if not later dug up for his food. The 'possum, on the other hand, gulps down persimmon, apple, cherry and other seeds with the fruit and, since they do not digest, later deposits them in a remote place.



In persimmon time, it is not unusual to find two or more 'possums up one tree. However, as in this case, the male even resents the competition of a mate and will not allow her to stay on the same limb with him.

He is a great exponent of night work; only once have I seen one abroad of his own accord in daylight. It was in the spring, when they mate. Looking out of the window early one morning, I saw a grayish creature ambling through the still leafless woods. He stopped at a tall chestnut tree and suddenly vanished. Upon arriving there I found a small black hand reaching out of a hollow root for more bedding material to make a fat old male 'possum comfortable. They wisely dread the daylight and make themselves really creatures of the night.

The variety in color of fur is striking and yet always in conformity with the law of protective coloring. The females usually have a dark bluish look, while the males, often larger, are gray or nearly white. Some males, however, are almost black. In the South I have found the lightest-colored ones on the high sand hills and the darkest in or near the gloomy swamps. The males grow very large, some reaching fifteen pounds and over. These big fellows have two formidable teeth in the upper jaw which are an inch or more in length and overlap the lower jaw like tusks.

Because the little ones are at first carried about and fed in the mother's pouch, they are not often caught by owls and other natural enemies. Later they ride about on her back and continue to rely on her protection. She may have a dozen or more at a time, but usually not more than one litter in a year, for little 'possums are seldom seen later than summer. How the old one manages to carry about with her a regiment of partly grown young is a mystery until it is noticed that they instinctively divide the weight, half on each side and towards her shoulders instead of on her weaker hindquarters. If at such a time she is attacked by a dog, she keeps her back and the young ones against a tree or stump and faces him with her bared teeth and a fine spirit of bluff. In the den she sleeps curled up, with her formidable mouth facing the entrance and the young piled within the circle made by her body and legs.

The fur in summer as well as winter is truly beautiful and admirable for warmth and general protection. It consists of soft white hairs about three and a quarter inches long and an under coat of dark tipped, cream-colored fur about one inch less in length. It is the under coat which ordinarily gives the color, and the outer coat which gives the ghostly, whitish look. In this fur the baby 'possums

easily sling with their hand-like paws, their long chins hooked over the mother's backbone and their little tails curving underneath her as a steadying support.

Unlike the other wild creatures, a 'possum seldom plays. It eats and sleeps, and it sometimes has bitter fights with others of its kind, but it is not sociable. A dozen skunks may den together for the winter, but the 'possum sleeps alone. A cheerless life, perhaps, and yet the little animal seems to be remarkably contented.

In trying to learn something of its language, I kept several specimens in large enclosures and succeeded in raising a litter of four young ones. The only sounds, however, which I ever heard any of them make were deep-throated growls, showing anger, and used in defense by both sexes, hisses when annoyed, a click of the lip made only by the male, and the squeaking or squealing of the very young when separated from their devoted mother. There were no loud calls to disclose their presence to enemies as well as friends. So wonderful is their sense of smell that they seem to rely on that as a means of keeping in touch with one another.

A RARE EXPERIENCE

It is unusual to see 'possums in the winter time, and the author was fortunate to secure such a photograph as this.

Experiments, too, brought out the rather strange fact that the female, though considerably smaller, will surely kill a male if he cannot escape her. After losing one and nearly having a second killed in this way, I gave up any idea of keeping the two sexes in one enclosure. The males occasionally fought with each other, but not in a serious way.

The four young ones, though scarcely larger than furry mice, could dig like rats, and eventually tunnelled from one pen into the other and then out. First, three left in this way, a small, very docile female alone remaining. Finally she, too, escaped and never returned. They were the cutest little woods' brownies imaginable, quick, alert and quite willing to be handled without any show of biting. The nearest thing to play in which I saw them indulge was hopping about like grasshoppers at intervals. Once they did this after eating, again after a sound sleep. Ordinarily, they were laughably full of dignity.

The advance of civilization will not destroy the 'possums, for they can, if necessary, live on the farmer's corn, tomatoes, sweet potatoes, peanuts, cherries, apples, grapes, etc., and grow fat. In the North, this growing fat is an important thing because it enables them to partly hibernate in icy weather. Being a barefooted creature and likewise having no fur covering on ears, nose and tail, the 'possum lies abed when the mercury falls, and absorbs for food the surplus fat stored during the warm days of plenty. Thus it happens that he is not often trailed in the snow. As if knowing the importance of this fact, he feeds like a glutton in the autumn and, after he has put down the last luscious persimmon with many a slobber, sometimes even dares to raid the hen coops or duck yards. This usually happens in November and means that the food in the woods is scarce and the 'possum is instinctively preparing for the long months of cold. He gets into the chicken yards by climbing the posts, then, in the dark, easily slips upon a duck, or, if necessary, seizes a hen on the roost. According to my observation, a weasel catches a chicken's throat, sucks the blood on the spot the first night and eats some of the breast on the second night, if it returns at all. A fox slyly carries off the hen and eats her in a safe place; but the 'possum grabs the chicken any way he can, regardless of fluttering and squawking, and usually first eats the head, then the entrails, leaving the remainder for future visits, until nothing is left except wing tips and feathers.

Though the 'possum does not do us as much good as the insect and mouse-destroying skunk, he does us little harm. A wood, without any prints of his hand-like feet, somehow seems deserted and less interesting. One likes to think of him climbing

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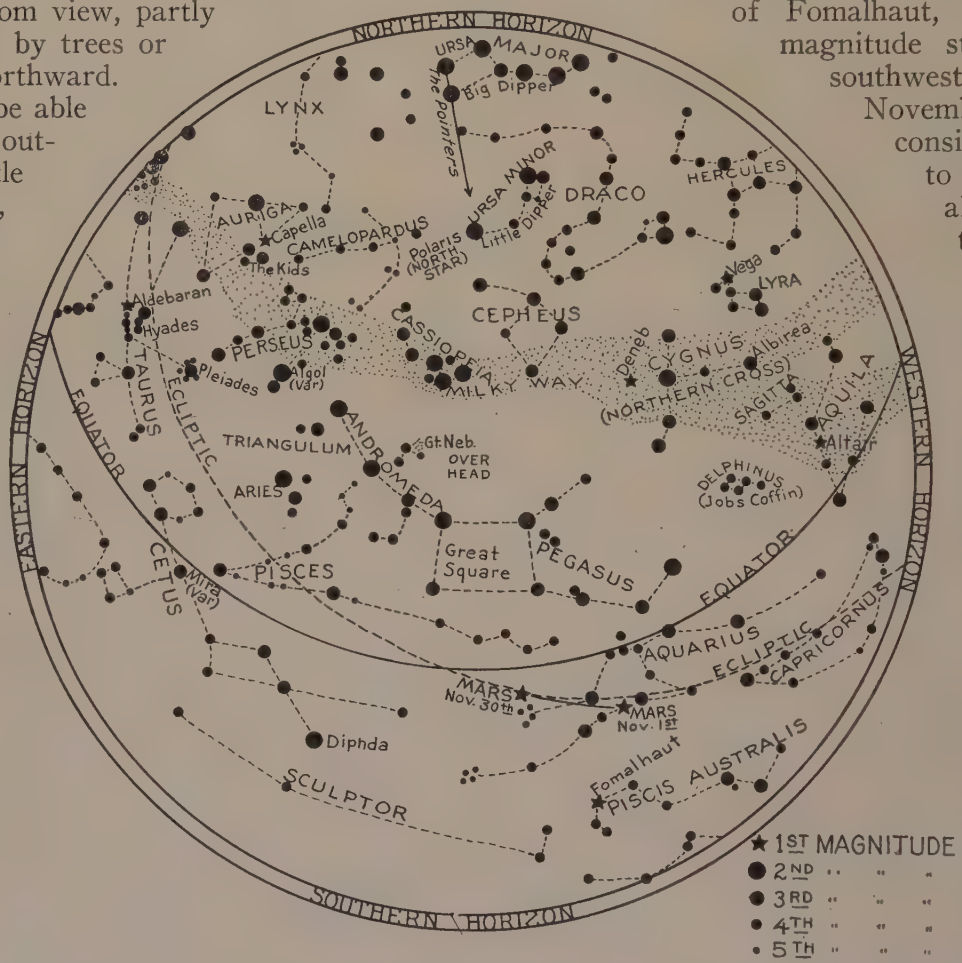
The Evening Skies in November

By ISABEL M. LEWIS

THE OBJECT that will probably first catch our eyes as we gaze skyward some clear November evening will be the straggling W in Cassiopeia in the northern heavens high above the pole. We will probably search in vain for the Big Dipper, for it lies on the opposite side of the pole from Cassiopeia and is now so close to the horizon that it is concealed from view, partly if not completely, by trees or buildings to the northward. Possibly we will be able to make out the outlines of the Little Dipper, though, with the North Star, Polaris, at the end of its handle. Its seven stars are inferior in brightness to the seven stars of the Big Dipper, only two, Polaris and Beta in the bowl of the dipper, being of the second magnitude. Yet with the aid of the chart we can trace it, without much difficulty, to the north of Cepheus and east of Draco, the Dragon.



Next to Cassiopeia, the Great Square in Pegasus with the constellation of Andromeda joining it on the east, is one of the most noticeable of the fall groups. It now lies directly on the meridian due south of the zenith overhead. To the southwest of the Great Square lies Aquarius, The Water-Bearer, which can be distinguished by the Y-shaped group of stars, the urn from which a stream of faint stars is flowing toward the south and southeast. The planet Mars, still in Aquarius where it has been for many months, is now moving rapidly eastward and receding from the earth. It will decrease noticeably in brightness during the month but will continue to be the brightest object above the horizon for some weeks.

It will be interesting to observe from time to time how Mars is moving with respect to neighboring stars. At the beginning of the month it lies a little west and some distance north of Fomalhaut, the bright first magnitude star now in the southwest. By the end of November it will be a considerable distance to the east of Fomalhaut and below the western edge of the Great Square. This apparent wandering of the planets among the stars reveals the fact that they are comparatively near to us—members of our own solar system. The stars appear to be fixed in position from year to year only because they are so tremendously far away. Many of them are traveling onward through space at greater speeds than the planets are moving in their orbits around the sun.

Over in the east this month we will recognize some old acquaintances of last winter in the Pleiades and Hyades in Taurus, and Aldebaran, the fiery red eye of the Bull. November has been known in ancient times as the Pleiad month, and it was said that the ancient kings of Persia never failed to grant any request presented to them on November 17, the day when the Pleiades came to the meridian at midnight. This exquisite little group with five stars forming a tiny dipper, and two additional stars

(CONTINUED ON PAGE 320)

Heron Colonies in the North

By L. W. BROWNELL

(PHOTOGRAPHS BY THE AUTHOR)

WHEN one speaks, or thinks, of a heron, it is with a setting of the moss-hung live oaks, the tall palmettos and the quiet lagoons of the south. We have always associated the heron with a warm clime, and naturally, for they are largely birds of the semi-tropics. Of the dozen species that are natives of North America all are inhabitants of Florida and the Gulf States. Nevertheless some three or four species wander far north of what we consider should be their natural habitat and are found breeding in the northern states, though never so commonly as in their favorite haunts, the swamps and sloughs of the southern states. Herons like company and sometimes nest in colonies made up of several species living together in perfect peace and contentment. In Florida, Georgia and Texas these birds were once very numerous and their colonies

BEAUTY IS ONLY PLUME DEEP

Young night heron who is doomed never to qualify in a bird beauty contest, which is not worrying him in the least.

UPPER

JUDGE SNOWY HERON

His feathers a lure to milliners, this chap is keeping an eye open for marauding humans.

LOWER

EGGS OF A BLACK-CROWNED NIGHT HERON

Large twigs go into the making of a heron's nest, and provide a home used for several seasons.

often enormous. But killing for millinery purposes has made nesting by thousands no longer possible, and a colony of more than a thousand birds is an unusual thing today. Wholesale killing was made easy for the plume hunter because the plumes are only at their best during the breeding season. It was then that the birds were hunted, and I have visited a southern rookery in which not a living bird was left, old or young, although the nests were full of the bodies of baby birds starved for lack of parents to feed them. The American egret and the snowy heron have suffered much to adorn hair and hats, but now this slaughter of the innocents has been, to some extent, stopped. But some of the species, as before intimated, annually migrate northward to rear their young.

NEST AND EGGS OF A GREEN HERON

This home was photographed from a perch thirty-five feet above the ground.

There is one northern colony composed of about one thousand pairs of birds, almost entirely black-crowned night herons, which have occupied the same rookery for many years. Natives of the vicinity declare that "them quawks have allus ben thar," and it is entirely probable that the place has been used as a breeding rookery for many generations. The colony occupies a small piece of wooded swamp land on a private estate, this partial protection assuring some immunity from pot and plume hunter. The colony neither materially increases nor diminishes in numbers, despite the fact that hundreds of young must naturally be reared there every year. Some of the young must come back to take the places of the old birds that have died, but the majority evidently join other rookeries or form new ones of their own.

WITH THE WHOLE WORLD BEFORE THEM

Baby black-crowned night herons scanning the sky for mother with a fine meal of fish clutched in her bill.

The colony is situated not much over a hundred yards from a main-traveled road. The

ground is covered by from one to three feet of water, mud, ooze and decayed vegetation. My first visit to this rookery was made about the middle of May. Birds were constantly passing overhead, uttering their unmusical but unmistakable cry which has earned for them the name, common in many localities, of "quawk." It was early morning and they were returning from their night's fishing grounds, situated probably several miles away. Soon after first having heard them I left the road, crossed two fields, pushed my way through some tangled underbrush into the woodland beyond, and found myself on the confines of this wonderful city in the air. I stood still to view the sight for a few minutes while the inhabitants were unaware of my presence. Once let them discover me and pandemonium would break loose. The trees were all tall, slender, and branchless for at least one-third of their height. Nearly every one held from one to half a dozen nests, and in one I counted ten. Each nest was occupied by one of the birds covering the eggs, for in but a few had the young been hatched. The nests were but rough platforms of twigs and small branches, some so large that they seemed almost too great a burden for the birds to carry. These structures were placed at distances varying from thirty-five to eighty feet from the ground. They had evidently been used year after year with a little repairing each spring when a new family moved in.

After remaining quietly in hiding for some time I took a step forward and was immediately discovered. One of the birds left her nest with a loud squawk. This was the signal for the city to spring into life, and the air

BELOW

Back hair up, this half-grown night heron is announcing to his fellows that a fishing expedition is in the forming.

ABOVE

Full-fledged night heron who has not yet donned his mature coat of gray and black.

SOMETHING STARTLING HAS HAPPENED

Consternation reigns among these baby green herons at the sound of intruding humans.

was filled with birds rushing wildly here and there in an apparently aimless, unreasoning fear. Beating wings and loud, discordant cries made a deafening tumult of sound. For the three hours that I remained an alien in this bird city the inhabitants did not for one minute cease their clamor. About a month later I again visited this bird metropolis. Nearly all the young had been hatched, and most of them had left their nests and were sitting about in the branches of the trees in family parties of three or four. There was the usual deafening outburst of cries when I first put in my appearance with a leit motif of hungry young calling for food. The youngsters' cries are in a monotonous tone, never ceasing, and forming an accompaniment to the harsh cries of the older birds and the other sounds of the rookery. The tumult was not so long continued on this occasion. The cries of alarm slowly subsided and the old birds soon settled down to business, almost ignoring my presence. The only sounds now were the rushing of wings, the cries of the young, and a splash in the water now and then when some unlucky youngster fell from his perch. These falls did not seem to hurt them, but woe to the unlucky young heron that was not large and strong enough to climb back into the branches again. Once on the ground he was entirely deserted by his parents and left to starve, no matter how much he might call to them. Many had met this fate, for a number of dead bodies, in different stages of growth, were found.

LIKE WHITE-ROBED JUDGES

Snowy herons, whose pure plumage has made them easy targets at terrible cost to their race.

I spent the entire day in this city and enjoyed every minute of it. Part of the time I spent in the tree tops. On all sides and below me were the nests, hundreds of them in sight. While most of them were empty, some still contained the half-grown young, and in a few the eggs had not yet been hatched. In the branches near each empty nest were grouped its former occupants, and overhead the old birds constantly passed and repassed, intent on their duties, and paying but little attention to me. I wonder whether the old birds ever get any sleep during the breeding season, for their nights are occupied in fishing and their days, seemingly, by a constant flying to and fro, over and through their aerial city, intent upon some mysterious business of their own, and with only an occasional short rest in the branches.

The smallest of our herons, excepting the least bittern, is our green heron, also a resident of the north, and one of the commonest species. They do not build in colonies exceeding ten or a dozen pairs but are widely distributed and are likely to be found breeding almost anywhere. While they prefer lowlands in which to build I have found their nests on perfectly dry hillsides. They are very shy, not even allowing the intimacy that is possible with the night herons. I have for years visited, almost every spring, a small colony of half a dozen pairs situated in a piece of marshland grown to second-growth maples and elms. Although I have repeatedly photographed their nests and young, I have never yet been able to catch more than a fleeting glimpse of the old birds. On each occasion they have deserted their young and nests to my tender mercies, disappearing without even a protesting cry. The nests are not the bulky affairs that the night herons build. They are made of much smaller twigs so loosely laid together that it remains a mystery that they do not fall apart, emptying their contents to the ground.

The great blue heron breeds in more limited numbers in the north, where the nests are so well hidden in the midst of dense swamps that the whereabouts of but few of their colonies is known. I know of one colony of these birds containing eleven nests. It may seem strange that any colony of wild birds can be said to consist permanently of any stated number, yet in this case it is apparently a fact, for during the years that the birds have been known to nest in this place their numbers have not

(CONTINUED ON PAGE 320)

Bittersweet, Most Decorative of Wild Fruits

By ALBERT A. HANSEN

CLIMBING bittersweet or waxwork is familiar to us all on account of the brilliant clusters of reddish-orange fruits or arils so commonly collected in the fall and prized as a house decoration throughout the winter.

Climbing bittersweet, *Celastrus scandens,* is a twisting, twining vine that sometimes climbs to the uppermost branches of trees, thirty or forty feet in height. More often it is found clinging to fences or scrambling over stone walls. The flowers are small, greenish and unattractive, but they are replaced in the fall by bunches of beautiful, orange-yellow, berry-like fruits. The outer coating of the fruit splits into three parts on maturity, and the parts bend backward to expose the vivid and attractive scarlet berry within. A few clusters of the handsome fruits placed here and there about the house add a delightful touch of indoor color during the drab winter months, since they retain their brilliance until spring.

PRIZED AS WINTER HOUSE DECORATIONS

A cluster of orange-colored fruits before the shell has opened to reveal the brilliant berries within.

BITTERSWEET IN JUNE DRESS

(Right) The small, greenish-white flowers of early summer are unattractive, shyly blossoming on fence and stone wall.

The scarlet, orange-framed berries have an appetizing look, but in this case looks are certainly deceiving, since they possess a disagreeable, sweetish flavor. It is said that bittersweet leaves are poisonous to horses, which is not difficult to believe, since a close relative, Euonymus, contains a powerful poison that acts on the heart. The inner bark of the climbing bittersweet is edible and was used by the North American Indians during times of food scarcity.

The Menomini Indians of Wisconsin preserve a curious legend concerning the origin of climbing bittersweet, a legend that probably originated through a fancied resemblance of the twisting vine to the intestines of man. It is related that when Manapus, one of their legendary heroes, was walking through the woods, he removed his entrails and cast them on a tree with an incantation that they grow and furnish food for the Menomini tribe. The Menomini name for climbing bittersweet is Manapus otate, meaning literally "entrails of Manapus." Although not a pleasant legend, it is interesting because of the insight it gives into the childlike beliefs of the Indian mind.

Occasionally one may note dwarfed and unhealthy looking bittersweet vines growing on fences and in thickets. The chances are that the trouble is due to an infestation of tree hoppers, little parasites that suck the life juices out of the bittersweet stems. These strange little hoppers build tiny white houses on the bark as a protection to the eggs and young during cold weather.

Almost the sole charm of the climbing bittersweet is found in the colorful arils, perhaps the most decorative of our wild fruits, which contribute much to the vivid autumnal coloration of October days. Among its interesting relatives may be mentioned

(CONTINUED ON PAGE 300)

PETER TAKES A LOOK AT HIS NEW PLAYMATE

They worked things out perfectly, Billy conceding that Peter was boss, and Peter keeping his badger friend in his place.

Billy, the Badger

By WILLIAM L. AND IRENE FINLEY
Of the National Association of Audubon Societies

(PHOTOGRAPHS BY THE AUTHORS)

"CONTENTS: one badger. Name: Billy," we remarked musingly to ourselves as we signed the invoice for the packing crate. While we were hunting for the chisel in the toolchest, we permitted ourselves no slight wonder as to how welcome a boarder friend Billy was going to be. In fact, we lived over other experiences with badgers, and one in particular.

Our most vivid recollection was when we were tramping along a trail in southeastern Oregon and spied a badger in the sagebrush. He started to run away, his flat, squat body careening like a toy tank on wheels, his long hair drooping over the edge and his short legs twinkling so rapidly that he seemed to roll along through the sand. He was easily overtaken, but when we were within a few feet of him he swung quickly with snarling, open jaws. A long jump to one side was all that saved a nip on the shins.

Although we had him cornered away from his burrow, Mr. Badger had no difficulty in holding us at bay, turning quickly at us as we moved. After a while, he saw he couldn't get back to his home and turned tail. We advanced, and he flashed about again to face his enemy. After backing around a while, he decided the best solution was to dig in. How he made the sand fly! Soon his sharp front claws struck solid earth, cutting the ground with the rasp of a dog gnawing a bone. When he had a pile dug out, he backed up on it with all four feet and sent the dirt flying out behind like a rotary plow in

INTENT AND ON THE ALERT

Cornered, the badger gives a stiff fight and shifts like a flash at the threat of danger.

TRYING HIS CLAWS AT FARMING

The idea that Billy would make good at digging potatoes was a fine theory but in practice he ran a zigzag course at the expense of efficiency.

IMITATING A ROTARY PLOW

Billy, at right, making the dirt fly as the snow before a steam plow cutting into a drift.

the snow. He was halfway in, but the instant we moved or made a slight sound he flipped quickly and was sitting in the hole instead of digging in it. We could readily see how he gained a living by digging out squirrels. In fact, where squirrels are so abundant as to be destructive to fields of alfalfa and grain, the badger is a useful animal. But one is likely to come a sad cropper on a gallop across the desert on as the crowd scattered, Billy proving a more effective weapon than a policeman's club.

Billy had been brought up to the luxury of a big room with fresh air and sunlight and was never allowed to dig in the ground. We discovered later that this prohibition was one of the keys to the badger temperament. His bill-of-fare consisted of cooked meats, potatoes and gravy, egg or milk mixed

NOT THE GENTLEST OF PETS, BILLY NEEDS HANDLING WITH GLOVES

In fact, shin protectors are an excellent precaution in case the badger decides on a playful nip at the nearest ankle.

a horse when the horse's foot drops suddenly into a badger hole.

Yet Mrs. Kate O'Neil of Arlington, Oregon, raised Billy rustling about in the box before us from the time he was a baby. She told us that she handled Billy and petted and fed him, and he was gentle with her. At times he would back up with his mouth open, dancing up and down to show that he wanted to play. She admitted, however, he could not resist occasionally biting at her feet or ankles. When she put a little collar and chain on him and led him down the street, people stopped to look and nudged each other. Even the traffic of the village was interrupted. Billy, his mistress had told us, was fond of ice cream. When she took him in the confectionery store to revel in a quart of this delicacy, the villagers assembled around the doorway. Why not, to see this child of the sand and sage taking to the lure of civilization? The exit was generally blocked, but Billy would give a grunt or two and rush for the nearest ankle. Feet would fly in every direction with graham crackers, tomatoes, ice cream and plenty of water for drinking and bathing.

So Billy's mistress sent him down to visit on our ten acres. She wrote, "I should like to have you take a few pictures of him." And she shipped him forthwith. As we shoved the chisel's nose under the edge of the box top, Billy was hissing and grunting in anger at being closed up for so long. Our little dog, Peter, was bubbling with eagerness, showing his usual great interest in any new arrival at his home. The lid of the box was pried off. Billy's nose came up one side of the partition and Peter's on the other until they touched. They sniffed and sniffed, puzzling out a common ancestry. Then the badger crawled out, seeming to recognize as clearly as any human that he was a visitor and must behave as such. He didn't offer to bite Peter's legs, but scooted underneath and upset him. Our offhand judgment was that in a fight Peter would get the worst of it, but one day in play the badger bit Peter a little too hard and there was a short scrimmage.

CLAWS LIKE A GRIZZLY, GRUNT LIKE A PIG, HISS LIKE A SNAKE

The badger digs merrily with his feet, wallows in the dirt with joyful grunts and sounds like a snake between times.

To our surprise, the badger gave up immediately, and from that time on Peter was boss.

As we watched this young badger, we noticed a combination of animal characteristics in his makeup that would be pretty hard to untangle. Somewhere away back in the genealogical line he must have been related to a wild boar, judging from his vocabulary of grunts and his joy of wallowing in the dirt and water. His long, strong claws were better than those of any rodent for digging, and much like those of a grizzly bear. At times he hissed like a rattlesnake. His thick, warm coat was a fine protection in winter, though rather hot in summer. His sharp canine teeth showed he was a real carnivore or flesh-eater.

Why shouldn't Billy have a chance to dig in the cool earth when it was so warm? We knew he would appreciate it, and we had forgotten that his mistress had told me not to let him dig. The moles were bothering in our garden, and it seemed just the thing to turn Billy loose to rid me of these pests. So we introduced him to a new mole hill. He scented game. The dirt flew as it had never flown before in our garden. Snorting with his nose in a mole hole, he scratched and kicked, fairly starved for the taste of rodents.

He was already half under the ground when we stooped down, watching with great interest. In a flash he backed out of the hole, lurched forward for a convenient ankle. His sharp teeth sank into the flesh and we leaped in the air as he reached for a taste of another leg. Ordinarily we are not afraid of animals, but the quickness and viciousness of the attack were too much. The flight across the garden was mostly in the air, with Billy a close second. But once a safe distance away, the erratic Billy shuffled back to work in his hole. We suspect that Billy's reason for attacking was that he was afraid he would be taken away from the very place he longed to be. It was the instinct of protecting himself in his home burrow. Digging in the ground, all his friendliness disappeared in a flash and reverted to the wild badger of the sand and sage. Eight or ten feet was the respectful distance he demanded before a lunge for the nearest ankle.

A few minutes later Peter came up. We wanted to see him give the badger a good trouncing, but had our doubts. Peter, however, knew better what he

was about, and it so happened that he, too, was fond of digging. Urged toward the badger's hole, he rushed up, crowding Billy aside, and down went his head into the hole. To our amazement, the badger, instead of attacking him, just watched Peter dig for a moment and then started a new hole.

WITH WATCHFUL EYE ALERT

Billy is now a football team's mascot, and he scoots low to the ground and tackles the first leg he sees.

It is almost uncanny how one animal understands another and strange how little the human knows the mind of the wild creature. The wild animal is extremely afraid and suspicious of man. We have found, in meeting bobcats, coyotes and others, that if we approach them without fear or in a spirit of total unconcern, they are more likely to be friendly than hostile. How quick they are to interpret fear or danger from human actions! The necessity for protection teaches them to read man's mind and actions.

Billy would have made a good post-hole digger if we could have directed his energies in exactly the right place. He might also have been useful in other ways about the farm. We started him on a row of potatoes, but instead of going straight down the row, he zigzagged this way and that. His energy ran too much in circles.

The badger inhabits the plains country of the United States, from Indiana west to the Sierras and from our southern border across the Canadian line. He can be easily distinguished by his very flattened-out body and short legs. The long hair that falls from his sides and his short tail give him an appearance like a turtle as he moves along. From his sharp nose a white line extends back across the top of his triangular-shaped head to his shoulders. Between the eye and the small ear are striking patches of black and white.

On the plains, the badger's burrows are easily distinguished from those of squirrels or prairie dogs because of their larger size. In the North he hibernates in the winter like a squirrel and has a litter of three or four young in the spring.

The character of the badger has left his name in various places. Formerly there was a barbarous custom of getting a badger in a barrel and then setting dogs on the animal to see if they could get him out. He is a determined, savage fighter. To "badger" came to mean to worry or pester from this barbarous sport of "badger baiting" or "drawing the badger." Wisconsin is known as the "Badger State" from the former abundance of badgers there. His flesh is sometimes used as food, and his pelt makes a very fair fur, although the hair is especially used in making shaving and artists' brushes.

But to return to Billy, we concluded that he was not exactly the kind of an animal that makes a good pet. He would take meat from our hands, but he would also take our hands. It was hard to teach him the difference, and and excellent idea to wear heavy gloves. In fact, one should also wear shin protectors unless he is a high and continuous jumper.

The boys at Pacific University wanted Billy as a mascot and as an example. Their football team is called the "Badgers." At the last report, Billy is still instructing in football, for he scoots low to the ground and tackles the first leg he sees and holds it.

What does Nature contribute to Christmas cheer? Myriad things, to be sure, but of them all the Christmas Tree, holly and mistletoe stand as symbols of the season. Where do our holiday trees come from? What is the story of holly? Do you know that the mistletoe is an air plant with many romantic tales about it? Entertaining articles about all three of these gifts of Nature which help us observe the Christmas spirit will appear in the December issue —a real holiday number.

The Turkey and His Ancestors

By HOWARD TAYLOR MIDDLETON

ACCORDING to the newspapers, the Society of Mayflower Descendants is to scrutinize more carefully than ever the credentials of applicants for membership. If this study is extensive, it is likely to include one whom we generally picture as becoming a welcome member of the Plymouth Colony as soon as the *Mayflower* dropped anchor and lay bobbing on the waves near Plymouth Rock—the Thanksgiving Turkey. But this proud and popular gobbler has a different story.

As this is to be a Thanksgiving tale as well as a turkey genealogy, it is proper that we begin by having that veteran keeper of history's scrolls, Father Time, unroll for us the musty page which tells of how *Meleagris,* the turkey, made his debut as a Thanksgiving celebrity. This most important event in the culinary world took place with great pomp on December 13 (old style), 1621, to fittingly commemorate the first plentiful harvest in the second year following the landing of the *Mayflower.*

To Governor Bradford, the first governor of Massachusetts Colony, we Americans owe a deep debt of gratitude, not only for the real origin of Thanksgiving, as a day specially set apart for prayer, rejoicing, and feasting, but for the introduction of roast turkey as the day's fare, as well. It happened thus: Having duly proclaimed a day of thanksgiving, Governor Bradford sent out four men in search of game. "So successful were these sportsmen in their quest," says an early history, "that they returned struggling under a great burden of wild fowl, principally turkeys, sufficient to meet the wants of the little colony for a week."

Then the thrifty housewives, despite the fact that their supplies of suitable material were very limited, skillfully took the matter in hand, making all sorts of luscious goodies with which to embellish the newly crowned feathered king.

When the glory in the eastern sky announced the dawn, a hill-top cannon thundered a salute, and, in answer to its noisy summons, a solemn procession wound its deliberate way toward the log meeting-house, the men marching three abreast, Elder Brewster, in his long preacher's camlet coat, walking beside them, bearing with becoming gravity the great Bible, while the Sergeant in Counsel and Governor Bradford followed on behind.

After the service came the dinner, and so penetrating were the savory odors emanating from the festive board, upon which were spread baked clams, broiled fish, and roast turkey, that Indian nostrils, deep within the forest's fastness, quivered in sympathy.

Believing these strange white-skinned folk to be their friends, and desiring to weld that friendship stronger, King Massasoit and ninety of his braves appeared as if by magic at the height of the celebration, several with haunches of venison across brawny shoulders. While this donated deer meat served at the first Thanksgiving dinner was pro-

KEYSTONE VIEW

ONE OF THE LARGEST TURKEY FLOCKS IN THE COUNTRY

The Idaho State Penitentiary owns this "herd," supplying many a Thanksgiving table with fat turkeys.

nounced by all to be substantial and delicious provender, yet for tenderest eating and delicacy of flavor, roast turkey reigned supreme.

When the Spaniards made their conquest of Mexico in the sixteenth century they found at Montezuma a fine zoological garden. In it were nearly all of the native birds and animals, with many gathered from afar. Strutting about were the ancestors of our domestic turkey, then serving as food for the beasts of prey of the emperor's menagerie. The zoo birds were domesticated and had been known in this state for several generations in Mexico.

Out in the outlying country there were many of the wild brothers and sisters of these birds. Oviedo, the Spanish historian of these early days, writes of "a kind of peacock abounding in New Spain." Before the first quarter of the century was over some of the domestic birds had been transported to the West Indies and the Spanish Main, where they were kept by Christian colonists. By 1541 they had made their way to England, and thirty years later were in high favor as the Christmas dish of the English farmer.

Bearing the name of turkey because of a belief that they came from that country, it was not until the middle of the nineteenth century that the ancestry of our domestic bird was worked out. Two distinct species were recognized, one inhabiting the eastern and southern United States and the other native to the southernmost Rockies and Mexico. In 1858 the Pacific Railroad Expedition's reported on birds found, establishing the fact of two species.

The following letter written from Mirador in 1867 by M. Sartorius, the noted Mexican naturalist, to Spencer F. Baird, to whom we owe the National Museum in Washington, is an interesting document in turkey ancestry:

"*Meleagris Mexicana,*" the naturalist wrote, "is tolerably abundant in this neighborhood, belonging more especially to the sparsely overgrown savannahs between the region of the oaks and the coast, the

Tierra Caliente or warm region proper. It is a very shy bird, living in families like the wild geese and keeping sentinels on the watch whenever the flock is feeding in the vicinity of threatened danger. It derives its nourishment from plants and insects on the ground, and scratches with its feet to aid in the search for food. In running, the swiftest dog cannot overtake it. It is not very fond of taking to flight, but its powers in this respect are not behind those of any of the allied forms. Its breeding season is in March or April, when the hens separate from the males to reunite into families again in September. The general habits during the season are much as with the domestic bird, although I cannot say whether they inflate and swell themselves out in the same manner. I am, however, inclined to doubt it, as the specimens I have handled did not have the tips of the wing feathers worn away as in the barnyard breed.

"The female lays three to twelve brownish-red, spotted eggs in the high grain and hatches them out in thirty days, as is the case with the tame turkey. The flesh of the wild bird is dry, but very sweet, like the tame fowl, and, like the latter, is dark on the back and legs and white of breast and wings. The white meat of the flesh on the breast of the Mexi-

MELEAGRIS, CROWNED KING OF THANKSGIVING DAY

Proud gobbler though he is, this strutting fellow did not descend from the turkeys that graced the board at the first pilgrim feast.

"A KIND OF PEACOCK ABOUNDING IN NEW SPAIN"

From the sixteenth century Mexican barnyard the Thanksgiving turkey comes to us via the West Indies and Spanish Main and the farms of England.

can and the tame turkey, as compared with the darker meat of the common North American wild bird is a fact of importance to be taken into consideration."

This letter points out some of the differences that if not quite too late. From New England, where these most magnificent of game birds were once so numerous, they are gone forever, and the same sad condition prevails in many other sections of our land. The wild turkey is making a last brave stand

BEING FED BUT TO BE FED UPON

Pompous descendant of the Montezuma race, whose feathers reveal that the wild turk of the east is a relative, not an ancestor.

fix our Thanksgiving Day bird's forebears as Mexicans. Both the Mexican wild bird and our friend who preens himself in the barnyard have a creamy white on the tips of the tail feathers and on the feathers overlying the base of the tail. In the wild turkey of the east these are chestnut-brown. Very often a domesticated bird will appear very like its Mexican grandad, several times removed, except for a greater development of the fatty lobes of head and neck.

It was the eastern wild turkey, then, that the Plymouth settlers found abounding in the convenient poultry yard of the neighboring forest. Not so today. The near extinction of the wild turkey of the east is just one more example of our utter disregard for the rapid decline of wild life until almost in the deep woods and swamp lands of the south and west. Among the places where large flocks may still be noted are some of the islands off the coast of Georgia, and certain parts of the southwest.

The home of the wild turkey is built on the ground and contains from nine to twelve (sometimes as many as eighteen) eggs of a warm yellowish-white evenly dotted over the entire surface with spots of reddish-brown. The nest, while usually constructed in open woods or a brush-grown field, is hidden away and difficult to find. This is not only as a protection against predatory animals but to keep away the gobbler as well, that rascal having an ugly habit of breaking the eggs in any nest he can find. It also requires the sharpest of eyesight to separate a brooding wild turkey hen from her surroundings

due to the protective coloring of her plumage.

When the young are hatched, they immediately leave the nest and accompany their mother on long rambles, returning to their original home for the first few nights, afterward roosting in any suitable spot. The mother keeps to high ground for a time, however, to avoid allowing her children to get a fatal wetting, they being particularly susceptible to dampness during their infancy. As soon as they have donned their second suit of clothes—when feathers replace the down—the turkey chicks are as hardy as any other wild fowl. Following the nesting season, flocks of from ten to fifty birds congregate in cultivated fields at dawn, ranging down into alluvial lands as the sun rides higher and seeking woodland shelter at nightfall.

There is a cousin of our turkeys, both wild and domestic, living in Central America. He is a smaller and more beautiful bird, known as the ocellated turkey from the eye-like spots on his tail feathers. He lacks the tuft of hairy feathers that appears on the breast of the others.

PHOTOGRAPH AMERICAN MUSEUM OF NATURAL HISTORY

MEXICAN ANCESTOR OF DOMESTIC TURK

The southern bird that was found in the zoo in Montezuma centuries ago and who has become our Thanksgiving fowl.

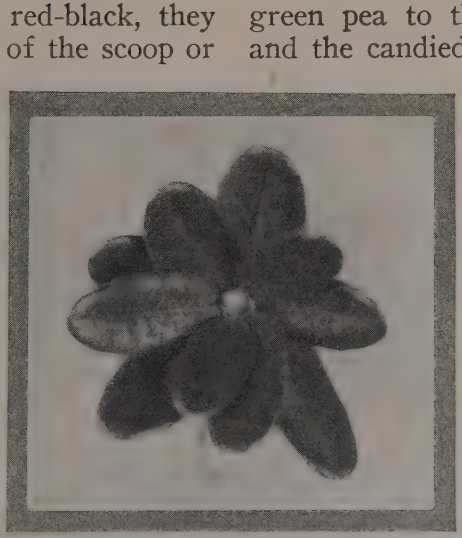
So our proud barnyard friend has made his way to us overseas and back again though he sometimes breeds with his wild American relative, who gladdened the first Pilgrim Thanksgiving Day, he does not develop into a wide variety of breeds like the rooster and hen, although from time to time there are rare and beautiful white turkeys like that at the head of this article. But on Thanksgiving Day he is the centerpiece of the day, and a single file of turks commemorating the last Thursday in every November would reach from the Chicago loop to the White House in Washington.

Sauce for the Turk

By RICHARD WILBUR

DYED scarlet, crimson or rich red-black, they tumble drunkenly into the cup of the scoop or bounce merrily into the bucket as the hand-picker strips them from the vines. Bending in the moist bog, the workers fill container after container, later to be emptied in a bright cascade into sorting tray and market barrel. It is the season of the cranberry, aristocrat of the peaty bog.

Like the well-chosen frame to the picture, the cranberry is the setting for the Thanksgiving turkey. The tart flavor and piquant tang of this berry has won rapid popularity. It has become to the turkey as the brown bread is to the bean in Boston, the green pea to the salmon on the Fourth of July and the candied sweet potato to the fried chicken.



TERMINAL CRANBERRY BUD

The flower will sprout from the enfolding smooth green leaves.

The cranberry is, as they express it now, 100 per cent American. More than that, it began its rise to popularity as a cultivated crop on that sandy arm of Cape Cod where the Pilgrims first enshrined the turkey as the dish of our annual feast of plenty and thanks.

Closely related to the huckleberry and blueberry, the cranberry bears the name *Vaccinium* macrocarpon. The generic name is of obscure origin; the specific name is in reference to the large size of the berries.

It is a native vine of North

America, growing wild in swampy peat deposits as far south as North Carolina and in the middle west.

In its immediate family in the wild state, the cranberry has two brothers, neither of which prosper under cultivation by man. One is variously known as the moss, gray, speckled or small cranberry, growing in northern America, as well as in Europe and Asia, and making delicious jellies and preserves. The other, also American, is the mountain or rock cranberry—dubbed cowberry or foxberry in England—preferring rocky uplands to swamps. Covering the ground with a dense tangle, the vines with their small berries are found throughout northern Europe, where they yield wild fruit that is evaporated to make sauces and preserves.

U. S. DEPT. OF AGRICULTURE

CRANBERRY RUNNER WITH SHOOTS OF VARIOUS AGES

At the left are four uprights in their second year's growth guarding two new sprouts. The upright at the right end is three years old.

So the common American cranberry is the one whose friendship has been cultivated by man. It grows on about thirty thousand acres in thirteen states, ranging from a few in Virginia, New Hampshire, Connecticut and Maine to about 14,000 in Massachusetts; 13,000 in New Jersey and 1,900 in Wisconsin. Washington and Oregon have a few hundred acres together. Nearly three hundred acres have been established on Long Island, New York, and smaller acreages have been cultivated in Rhode Island, Minnesota and Michigan. The Bay State, home of the cranberry's first cultivation, and New Jersey, its next home, share 90 per cent of the acreage.

Between 1810 and 1820 the first efforts to tame the cranberry were made at North Dennis on Cape Cod. The wild inhabitant of the bog, however, did not prove tractable. It was not until 1850 that enough experience had been gathered on its habits. In 1845 cuttings were sent to New Jersey for planting, and the middle of the last century saw the production surge forward as the cultivated berry tickled more and more palates and its fame spread.

The cranberry is particular about its home, demanding an acid peat soil, refusing to prosper in alkaline earth or in the ordinary soil of the farm or garden. It seems to delight in unorthodox places, the bogs along the Massachusetts Cape jutting irregularly into nooks and running around the base of hills. It is a thirsty berry, demanding heavy irrigation in times of drought and the protection of flooding water against injury in winter, unexpected frosts and insects. Except in New Jersey, the cranberry likes to be in the neighborhood of clean sand, and there is plenty of this on Cape Cod. It insists on cool summers, and without them catches diseases or rots on the vines.

Through its association with man the cranberry has developed many varieties, differing in color, in time of maturity, in keeping quality and in size. Some will redden in storage, others must color on the vine, and, as a general rule, the berry that comes to maturity on the vine is the better. Some are very acid and tart, while another variety has the sweetness of a Concord grape.

Red is the usual hue of the cranberry, although some of the wild berries are greenish-white when ripe. In the cultivated berries various shades of red prevail, although some of the less popular varieties are greenish or light red, spotted or striped with darker red. The blush of the cranberry is in the skin, but the nip of early frost or a too long stay in storage will send the color through the berry.

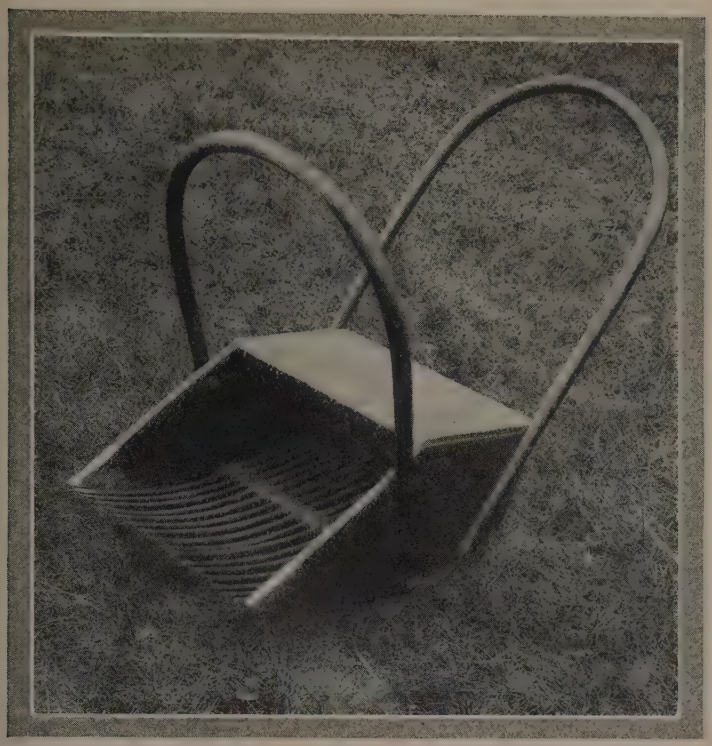
Cranberries in a new bog, or marsh, as it is known in some localities, are grown from cuttings pushed down into the soil. A leveling layer of sand is used, save in New Jersey and Wisconsin, aiding the keeping out of weeds. One of the first indications of the possibilities of the cranberry came on Cape Cod when sand was blown into a wild bog, and the

general use of sanding is now being followed.

The cuttings of the vines, selected for their purity of variety and healthy condition, are planted between early April and the middle of May. In the moist soil the cuttings send out a mesh of fine roots, without root hairs and rarely extending deep below the surface. In June and July, depending on varieties, the shoot blossoms with a delicate, four-petalled flower, white but inconspicuous against the background of smooth, evergreen leaves. Generally self-fertilized, but frequently aided by bees, the flower soon drops away, and within sixty or ninety days the berry has matured.

Gathering the cranberry provides an important local industry, although on Cape Cod in the past labor has been imported for this work. While some hand-picking goes on because it is more satisfactory in cleaning the vines, the red berries are usually gathered by running wide scoops armed with tines through the plants, stripping the berries from them. With an annual output of more than one million bushels, the cranberry has become an important crop. Cooperative marketing and grading methods have been applied to its handling, and in recent years various mechanical improvements have aided the progress of the industry.

So from this ruddy denizen of the bogs, given wild to man by Nature, there has been developed a valuable industry and a pleasing member of the cultivated berry world. The market that it has developed for itself even outside the United States has proved that the cranberry is a worthy companion for the Thanksgiving turkey.



U. S. DEPT. OF AGRICULTURE

WISCONSIN CRANBERRY RAKE

The scoop is used in the berry marshes of this state, allowing the pickers to stand at work.

U. S. DEPT. OF AGRICULTURE

CAPTURED SPRIG OF RED BERRIES

Although the main color of the cranberry is rich red, some are mottled or green.

WHAT animal is it that has the silhouette of a pine marten, the steel muscles of a wolverine, and the cunning of a weasel; who hates water like a cat and yet is an adept swimmer; who is king of the members of his wild family? You will find out next month in another article of the wild animal series with which William MacMillan has been entertaining us.

Educate for the Future

IN EDUCATION lies the solution of the problems, whether social, economic or political, that confront the world. It is the fundamental of progress and prosperity. We must depend upon it to conserve and recoup our forest assets, to preserve our wild life of field and timber, to assure us the wise and continued use of the great resources that Nature has given us.

November 17 to 23 have been set aside as American Education Week. During these seven days our schools, our civic organizations, our community groups and our governmental units will emphasize the vital importance of education. Each day will be devoted to specific phases of education, dramatizing them.

The American Nature Association and the American Tree Association are educational institutions, organized for instructing the people and broadening their viewpoints, not for profit. The Nature Association is dedicated to conservation, to introducing the great and wonderful gifts of Nature to the people, to aiding them in deriving the enormous educational benefit that lies—sometimes hidden—in Nature's works. The Tree Association seeks to stimulate in the public mind an appreciation of the trees and the forests, to urge them in their protection, and to aid in rebuilding them in the interests of future generations.

BY KESSLER

THE THINKER (Rodin)

Members of both of these associations are urged actively to cooperate in the activities of Education Week. Their officers feel that its success must be assured. It can be so gained by the whole-hearted efforts of all those whose privilege it is to realize the full value of education.

The first day of Education Week, November 17, has been designated as Constitution Day, commemorating the framing of that great document of free government made possible by the courage and self-reliance of men and women possessed of a great country, richly endowed. The second day will be Patriotism Day, dedicated to stimulate appreciation of good citizenship and pride in the achievements of their nation. On Wednesday the value of the school and the importance of the teacher in guiding the minds of the coming generations will be taken up for consideration.

Faced by a stupendous proportion of illiteracy, much of which was brought to light during the past war, educational authorities have designated Thursday, November 20, as Illiteracy Day. The message of literacy will be carried broadcast, for without it the doors to many of the other treasures of knowledge are forever closed. The physical well-being of a nation that uses its out-of-doors will be emphasized on Friday with observance of Physical Education Day. The use of adequate parks and forests as recreation centers has always been a fundamental aim of our associations, and this phase will play an important part in the observances of this day.

Recreation and the outdoors, how to use it, how to preserve it and how to increase it, will be the feature of Saturday, Community Day. The service which gifts of Nature—some of them destroyed or forgotten—give to the community will be urged upon the people. On Sunday "For God and Country Day" will be observed, and the message of education will be given from pulpits everywhere.

The importance of this week, not only in the present but for the future, cannot be too highly emphasized. In those fields where the members of the American Nature Association and the American Tree Association find their greatest interest, much has been sacrificed in the great forward march of our country. Much, however, remains with us but must be guarded and turned to the perpetual use of recreation and health. Education is the only means by which these essentials can be assured. The message must be spread through our education institutions and through those organizations of citizens cooperating with them. The directors of your associations urgently hope that you will find your places in the ranks in Education Week and serve with distinction.

The Japanese Beetle

By A. B. CHAMPLAIN
Pennsylvania Department of Agriculture

BIRD'S-EYE AND ALONGSIDE VIEW OF JAPANESE BEETLE

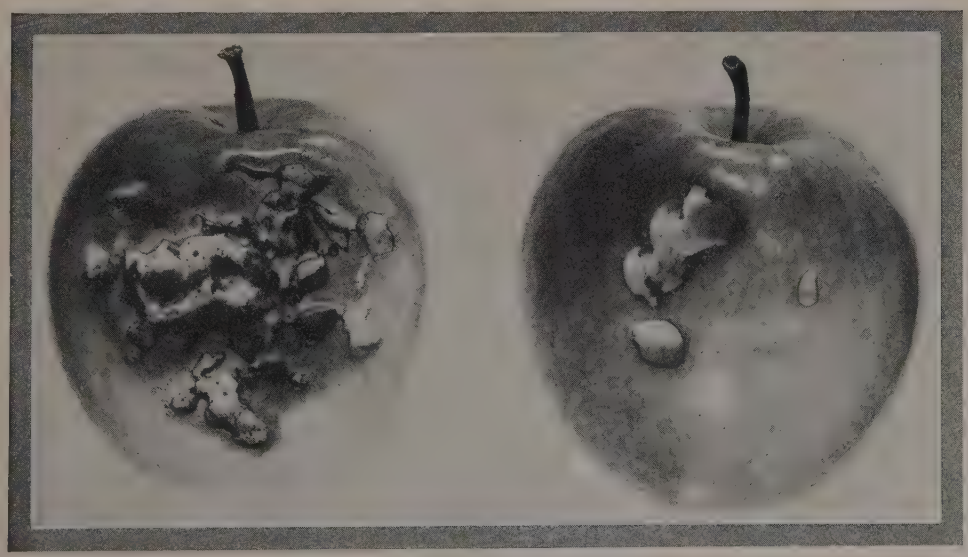
This beautiful bug of bronze and green, although one-half inch long, is a monster of destruction.

NEAR the village of Riverton, in Burlington County, New Jersey, a short time before 1916, a shipment of nursery stock was received from Japan. One particular case of this stock, probably containing iris and azalea, was opened, and the plants with the soil about their roots were carefully set out—the plants to grow up and become an ornament in their new environment, and the soil of Japan to mix in good fellowship with that of New Jersey.

Unfortunately, and unknown to the persons sending and receiving this shipment, there were stowaways aboard. Snugly hidden within the earth and debris about the roots of the plants were certain white grubs, the larvæ or young stage of the Japanese beetle. As the days went by these few alien grubs thrived and grew rapidly in their new home, feeding on the decaying matter in the soil, and to some extent on the tender roots of plants and grasses. The winter came and went, and having enjoyed a long, comfortable siesta in their dark habitat, they awoke with the coming of spring to resume their growing and feeding.

During early June these full grown grubs constructed cells by turning themselves round and round, and pressing the earth until a space of suitable form and size was moulded to comfortably contain their bodies. After resting in this underground chamber for a week or so, they were ready for the change to the pupal stage. The skin of the grubs split down the back and finally worked off entirely, leaving exposed the newly formed pupae. In this condition they are absolutely helpless; they can only wriggle or move a mere trifle, and are soft and tender, but they show all the external organs of the future beetle in their form. At last these pale, almost cream-white pupae become darker, and the colors of the future beetles commence to show themselves through the semi-transparent skin. Soon this skin is ruptured, and finally there emerge the fully formed Japanese beetle adults, at first somewhat weak and pale, but quickly becoming darker, stronger and mature.

Japanese beetles are beautiful, highly colored insects, about one-half an inch long, comparable in size to potato beetles, but more elongate; each with a head and thorax of bright, shining bronze-green and three pairs of shiny-green legs, would easily attract attention. The wing covers over the back are brownish tinged with the bright-green color at their edges, while along the sides and at the tip of the body there are conspicuous white spots which may easily distinguish them from other related forms.



RESULTS OF BEETLE APPETITES

An apple a day may keep the doctor away, but a beetle a day will keep the apples away.

This little band of pioneers was the ancestral nucleus of the great Japanese beetle infestation. Finding everything well adapted to their needs, they proceeded to make the most of their opportunities — they fed promiscuously upon the New Jersey vegetation;

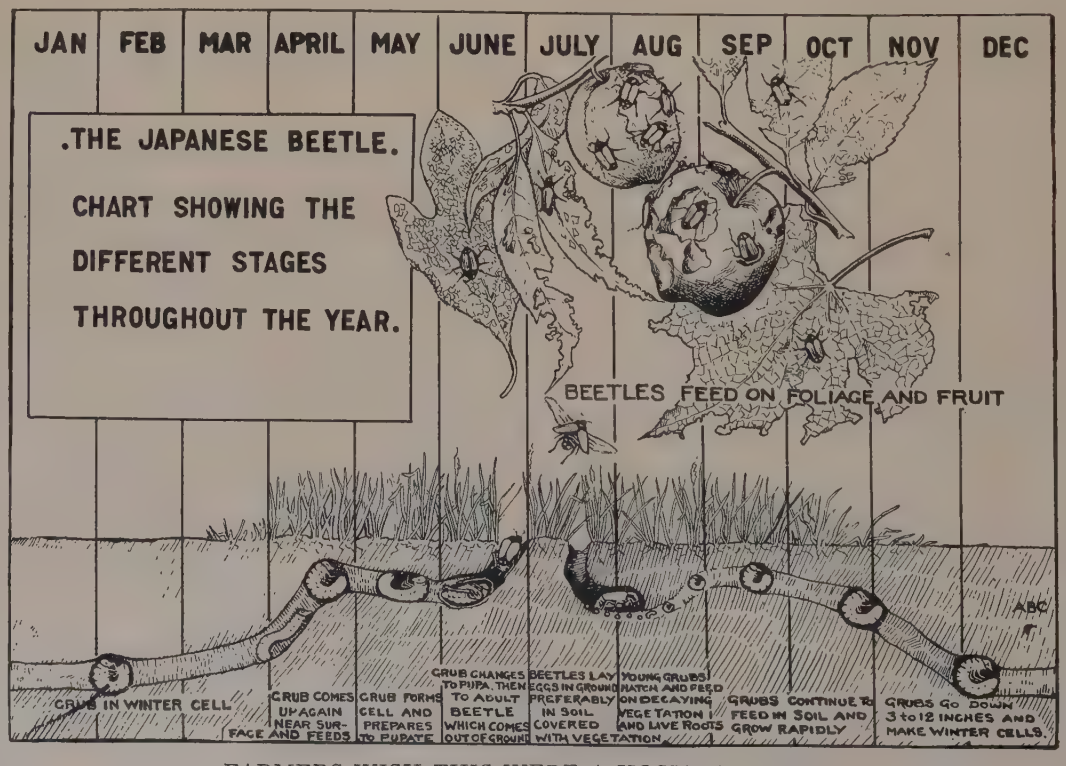
they mated and laid eggs, each female laying an average of thirty to sixty eggs in uncultivated places, such as weedy roadsides and grassy fields, lawns and golf courses. For awhile, unknown to human beings, unmolested by parasites and other natural enemies, the little colony multiplied and prospered.

MAKING LACEWORK OF LEAVES

Japanese beetles have made hearty meals from the foliage of this peach tree.

At first the discovery of this new addition to our insect fauna did not cause much alarm, and to the general public it was examined and discussed as a "novelty," but as time went on and the beetles began to overrun everything, feeding alike on roadside weeds and on the choicest fruits and vegetables, the menace of this omnivorous horde became evident.

Today there are many anxious eyes turned toward the Japanese beetle area. Since the time the pest was discovered in 1916 it has spread over an area of approximately 2,500 square miles, while in the original region of infestation the increase in numbers of this insect has been truly remarkable. During a trip to Riverton and vicinity, July 30, 1924, at which time a number of entomologists visited and inspected the original area, the spectacular aspect of the situation impressed everybody present. The outstanding features that were stamped deeply on the mind of the author, who was among the visitors, as we walked through orchards and along roadsides, were the browning autumn-like foliage where the beetles had passed like a scourge, eating the leaves until only mere skeletons remained, and the thousands of bright-colored green beetles which were in evidence.


JAN
FEB
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DEC
.THE JAPANESE BEETLE.
CHART SHOWING THE
DIFFERENT STAGES
THROUGHOUT THE YEAR.
BEETLES FEED ON FOLIAGE AND FRUIT
GRUB IN WINTER CELL
GRUB COMES UP AGAIN NEAR SURFACE AND FEEDS
GRUB FORMS CELL AND PREPARES TO PUPATE
GRUB CHANGES TO PUPA. THEN TO ADULT BEETLE WHICH COMES OUT OF GROUND
BEETLES LAY EGGS IN GROUND PREFERABLY IN SOIL COVERED WITH VEGETATION
YOUNG GRUBS MATCH AND FEED ON DECAYING VEGETATION AND LIVE ROOTS
GRUBS CONTINUE TO FEED IN SOIL AND GROW RAPIDLY
GRUBS GO DOWN 3 TO 12 INCHES AND MAKE WINTER CELLS.
ABC

FARMERS WISH THIS WERE A HOSPITAL CHART

Instead it is the annual story of the activities of the costly Japanese beetle.

The warm sunny day caused these beetles to become very active (they are strong fliers, and the air was full of the buzzing and humming of their wings as they sailed from one place to another like miniature airplanes on a battlefield). Then resting and feeding

they could be found by the hundreds on the foliage of trees and plants. A ripening apple or peach attacked by these hungry invaders would be completely covered in such a manner that they resembled balls of living, scrambling Japanese beetles. Our guide shook a tree, and it literally rained the green pests—they buzzed about like a lot of bees at swarming time, and settled and crawled about our persons in a very familiar manner.

THE FOREBEARS OF THE BEETLE

The four caterpillar-like animals are the beetle grubs and the two figures lower right are the pupae.

WHAT CHANCE HAS THE APPLE

In the right corner a beetle attack in mass formation, and above, the results.

At the present time this insect is known to occur in the United States only in certain portions of New Jersey, Pennsylvania and Delaware, surrounding the city of Philadelphia—namely, all of Philadelphia County, and part of Bucks, Montgomery, Chester and Delaware Counties in Pennsylvania, and in parts of Salem, Gloucester, Atlantic, Camden, Burlington, Ocean and Mercer Counties in New Jersey, and slightly in New Castle County in Delaware.

Now the Japanese beetle project is attracting attention everywhere. This cooperative plan to prevent the further spread of this pest is in the hands of competent experts of the Federal Government and of the states of New Jersey, Pennsylvania and Delaware, and these men are also working on methods for combating and reducing this insect by every means that human ingenuity can devise.

The most important of these methods, and the one that will be the most successful, in the author's opinion, will be the introduction of natural enemies, including the wasp and fly-like parasites collected by government agents in the Orient for this purpose.

In time we may expect to see this overwhelming infestation of Japanese beetles reduced to the *status quo* of an insect of nominal importance, in the same category with many other species of native leaf-chafers, where parasitic and predaceous enemies, disease and other conditions preserve and maintain a natural balance.

R. BRUCE HORSFALL

Noted Artist Joins Nature Magazine Staff

R. BRUCE HORSFALL, who needs no introduction to Nature lovers and who stands in the front rank of Nature artists, has joined the staff of NATURE MAGAZINE as Art Editor. Known for the absolute accuracy of his paintings, as well as for their beauty, Mr. Horsfall is both a naturalist and an artist.

Beginning his art studies in Cincinnati, Mr. Horsfall rounded them out in Munich and Paris. He first exhibited in Chicago in 1886. His illustrative work has been widespread, including both scientific, book and magazine work. Most of the colored plates used in the bird work of the National Association of Audubon Societies are from Mr. Horsfall's paintings. Twelve backgrounds for habitat groups at the American Museum of Natural History in New York stand as permanent exhibitions of his art, and he has done similar work for the State Museum at Springfield, Ill., and the Zoological Museum at the University of Minnesota, as well as pictures at the New York Zoological Park. He is active in many conservation and wild life organizations.

The directors of the American Nature Association feel particularly fortunate in being able to announce Mr. Horsfall's participation in their work.

Bittersweet, Most Decorative of Wild Fruits

(CONTINUED FROM PAGE 283)

the native wahoo or burning bush, *Euonymus atropurpureus;* the strawberry bush, *Euonymus americanus,* the cultivated European spindle tree, *Euonymus europeus,* and the Chinese box of southern gardens, *Euonymus japonicus.*

The two first mentioned are beautiful non-climbing shrubs which are close rivals of bittersweet, and are no less attractive members of that colorful tribe which makes the autumnal outdoors so dear to us. Like our climbing bittersweet their opened arils are bright crimson. Another native member of the same family, *Pachystima canbyi,* inhabiting our southernAlleghanies, is a low evergreen shrub, the seeds of which are enclosed in white arils.

BITTERSWEET—A TWISTING VINE WITH BRILLIANT WILD FRUITS

Some of these clusters have ripened, the outer coating bending back to show the shining scarlet berries within.

In gathering bittersweet, remember that tearing the plants to pieces destroys them; cut the stems cleanly, and leave plenty of seed to keep the species going.

Indiana Mends Her Fences

By RICHARD W. WESTWOOD

"MATCHSTICKS!"

We said it with a certain contempt, pardonable, we think, because only a few days before we had stood among the redwoods of Humboldt County, California. When we said it we were walking through the State Forest of Clark County, Indiana.

"Yes, but they mean something. Wait," said the State Forester.

We waited. And for the better part of two days we walked. We followed the untiring and enthusiastic footsteps of C. C. (Charlie) Deam, State Forester of the Hoosier commonwealth. He nearly walked us off our feet, but we learned a lot about a state with her forest fences to mend.

Now C. C. commenced to be a druggist. At the same time he used to start out of a week end, armed with a plant press, and walk. He botanized. He learned the growing things of his state by their first names and middle initials. He rose to high rank in the botanical world within and without the state. Then, back a ways, he became State Forester.

Indiana started out with about eighteen million acres of forest, more than three-quarters of the state's area. Today it has less than a million and one-half acres. It would take considerable hunting to find a patch of virgin timber, and if one succeeded it would be a mighty small patch. Of course, Indiana set out to carve its niche in agriculture and industry. It has done so, but, at the same time, has an item of some two and one-half million acres of idle and unproductive land, fitted only for forest, on the red-ink and liability side of the state's economic ledger.

Indiana started putting new uprights in its forestry fence in 1901 when it created a division of forestry. Two years later an area of 2,000 acres was purchased in Clark County, near Henryville, and designated the Forest Reserve. The spring of 1904 saw the first plantings on this reserve, designed to permit experiment in the best methods of managing the native woodlands of the state and the proper means to reforesting. Smaller areas have been gradually added until the Clark County State Forest, as it is now known, totals nearly 3,000 acres. With two decades of experiment and study passed, it is beginning to tell its story.

NORWAY SPRUCE AT HOOSIER FOREST

One of a variety of coniferous trees in small aboretum that invites visitors to the forest.

We had clambered to the summit of the highest knob in the forest. Atop it a wooden observation neither looked nor felt safe. Once insecurely aloft, however, we could see the whole leafy expanse of the knolls and valleys of the reservation.

"Now tell me what you think," demanded C. C. "Here's this country. It's farmed out. The forests once made rich soil. They went, and now the richness has gone, too. Poverty stricken crops are the result. What should this land be doing; what you see here or trying to grow the crops you've seen coming out here?"

The answer was plain, and we said so.

"Absolutely," declared C. C. "And that's what we are after here—to find out what trees it should grow again and how they should be grown. Now let's go meet some of them."

We did. C. C. knew them personally, their pedi-

grees and their life problems. Ninety-five different tracts have been planted. They represent a wide range of combination and experiment. In one tract we would find locust planted from seedlings. Some had been cultivated; some not. Some had been pruned lightly; others severely. They stand there together—the results—for comparisons and conclusions.

In another tract were sycamore, tulip, basswood, locust and elm planted between alternate rows of ash. The question: Which trees get along best together? One answer that was plain in this tract was that tulip mixed with ash prospers remarkably. In another area, where a locust planting had failed, sturdy white pine were prospering. In fact, one definite conclusion can be drawn from the planting, and that is that white pine is a successful tree in southern Indiana soil. Many have attained a remarkable growth. C. C. is very proud of them.

WHITE PINE LIKES INDIANA

This tree prospers and the yearly shoots of the young trees outstrip the two-foot rule.

There were many other tracts, in many of which no final conclusions are yet possible. They are experiments in spacing, in care, in soil enrichment. There is a demonstration windbreak planting for the farmer. There was the nursery with its baby white pines and spruces, and its tiny young hardwood trees. The nursery contains some 500,000 seedlings, all too inadequate to meet the popular demand for planting stock in the state.

C. C. was a stimulating individual to tramp the underbrush with. His eyes sparkled as he almost lovingly showed the diameter of the trees on a particularly successful planting. Inevitably he was sad over a failure, where trees did not prosper and wasted away. Of a sudden he would be down on his knees, exclaiming:

"Ah, a *Habenaria fimbriata.* A rare orchid rarely found in this section. Likes to grow on flat, no'count land."

Business of digging up a specimen of the orchid to be pressed in the plant press. Another find—a rare shrub. Yes, C. C. loves the growings things and knows them. What better qualification than that for a man entrusted with the task of recouping the almost vanished forest resources of a sovereign state?

In Indianapolis C. C. has the record of every plot. He knows how much it cost to plant them. He knows how much time and money have been spent to care for them. The records show measurements of the trees, like a book of baby's pictures on the way up to long trousers or skirts.

TO BREAK WINDS SWEEPING DENUDED ACRES

Demonstration planting of arbor vitae and Norway spruce to invite wind break and woodlot growing.

That night we sat—C. C., Will Guthrie, chairman of the State Conservation Commission and the writer—beneath the stars and before the beamed and cemented administration building, and talked forestry and forest taxation. We argued the state tax law,

(CONTINUED ON PAGE 308)

The Devil Fish

By DR. LEON AUGUSTUS HAUSMAN

A GREAT deal of misconception has been harbored about the octopi, and they have been for a long time libelously called "devil fishes." As a matter of fact, they are by no means evilly disposed towards human beings and the name devil fish belongs properly to a species of large tropical fish, a true fish, with gills and fins, which is closely related to the skate.

The idea that octopi are all large, fierce, and aggressively hostile towards men, has been brought about chiefly through the description given by Victor Hugo in his "Toilers of the Sea" of a combat between a man and a "polyp," by which he meant an octopus, and by the truly thrilling picture of this combat by the famous illustrator, Gustave Doré. It is time, the octopus must feel, that the odium which has been cast upon their family name be removed, and someone should plead their cause.

The members of this numerous tribe are really not fishes, but molluscs, and are closely related to the cuttle-fishes or squids, the argonauts, and also to the snails, slugs, clams, and oysters! They occur chiefly in the waters of the Mediterranean, the West Indies, Hawaiian Islands, the Chinese seas, and the northwest coast of North America. Curiously enough a very small species was discovered as far north on the Atlantic coast of North America as the Bay of Fundy, in Nova Scotia, by Professor Verrill, of Yale. In 1872, while dredging for specimens in the bay, he hauled up from a considerable depth a tiny octopus of the most surprising color and size. This diminutive little pigmy possessed a body measuring only one and a quarter inches in diameter and arms less than two and a half inches long! The entire creature was a pale-bluish color, thickly besprinkled with brownish spots. Subsequently other individuals were found, and the species was named Baird's octopus. This is the only member of the octopus family known to live north of Cape Hatteras.

The octopi live as a rule in the crevices of rocks, for their bodies are soft and must be protected. During the day they remain quietly concealed, but at night are all vigor and alertness, sallying out actively enough in search of food. By means of the numerous sucker discs on the under side of their long arms, octopi are able to climb with surprising agility over rocky sea bottoms and to ascend perpendicular walls of rock with ease. The long, muscular arms, or tentacles, as they are called, are very sensitive near their tips, and instantly seize upon any moving object, if it be small enough to serve as food. As soon as one arm is thrown about the prey the other seven arms instantly come to its assistance and are swept about the struggling prey, pressing it against the center of the disc, where is located a mouth armed with a pair of powerful, horny jaws, much like the beak of a parrot. Though they feed upon many of the smaller marine creatures, their principal relish is for crabs and lobsters, and many discarded and broken shells of these creatures may be found about the entrances to the rock-crevice home of an octopus.

EATING MECHANISM OF AN OCTOPUS

The sucking discs on the tentacles hold the prey carried to the horny beak in the center.

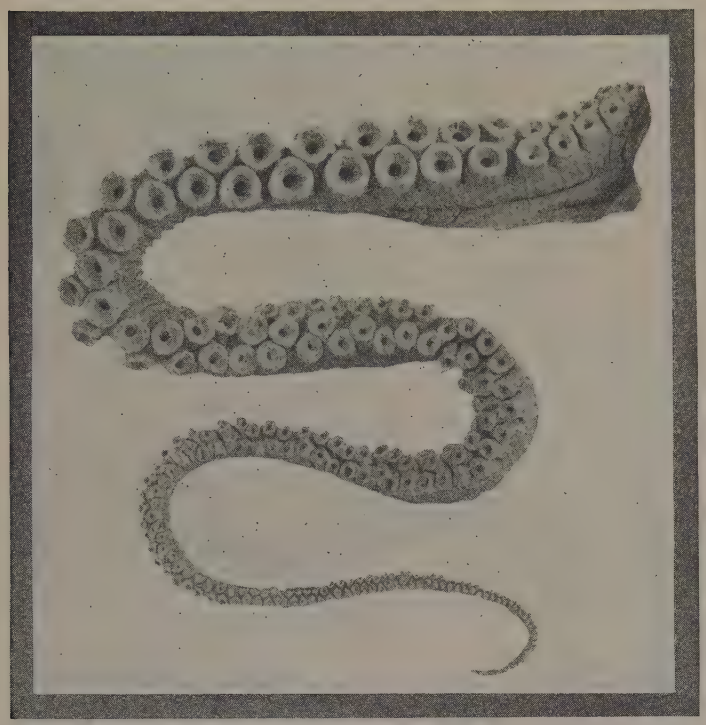
BAIRD'S OCTOPUS

Not a very terrifying member of the family. He is hardly larger than a postage stamp.

The octopus is not aggressive, notwithstanding his reputation, and when danger threatens he retreats into fissures in the rocks, or between large stones, or eludes pursuers in a very clever way. Most octopi possess, near the liver, a large gland or sac which is filled with a dense, heavy, jet-black fluid. This they are able to squirt suddenly out into the water from the funnel, or siphuncle beneath the head. When this "ink" is ejected into the water it expands into a heavy black cloud, baffling pursuers. The smoke-screens battleships used in the late war may have

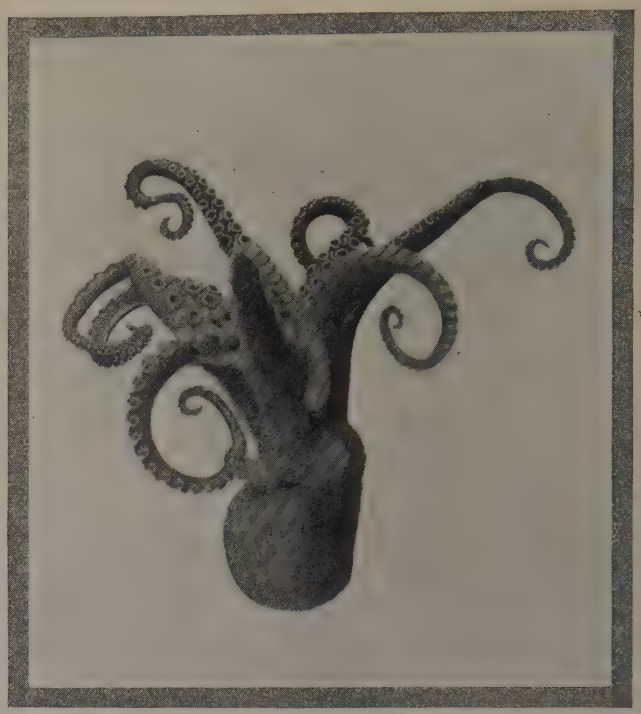
been learned from the octopus. It may seem strange that so heavy a creature as an octopus can swim, and yet this is quite true. This they do by drawing into a cavity into the body, known as the mantle cavity, a quantity of water, and then suddenly expelling it, with much force out of the funnel. This enables an octopus to dart backward like a flash. With each recurring water-jet the body is driven backwards in a series of leaps, and by directing the funnel either to the right, left, or downwards, he is able to steer a course with considerable accuracy.

When an octopus is lying quietly among the rocks he is very difficult to see, for not only is his body more or less rough and irregular, but he has the power of changing his color to quite a considerable degree, taking on more or less the general hue of his surroundings.



THE TENTACLE OF AN OCTOPUS

The discs continue to near the tip of this long arm, one of eight which the creature possesses.



SIDE VIEW OF OCTOPUS

The siphuncle, by means of which the creature swims, is near the tentacle curved under the body.

The octopus tribe is a rather solitary race of beings, and not caring much for each other's society, except during the breeding season, and are usually found living singly, each in his crevice. After the eggs are laid, the mother octopus, however, develops quite a maternal instinct. The eggs, which are all attached to a stalk much like a bunch of grapes, are the object of her watchful solicitude. They are placed in a cavity in the rocks, and as many as five hundred thousand may be laid in one brood. The mother octopus guards them carefully, frequently turning them over with her tentacles, and supplying them with jets of fresh water, from time to time. She seldom leaves the nest during the incubating period, except only for very short periods, to search for food. The breeding time lasts about seven weeks, and when the young octopi hatch and

OCTOPI, FOUR OF THEM

Tied up in their own tentacles, this quartet is being dried for food.

(CONTINUED ON PAGE 318)

Of the People, by the People and for the People

ON SEATS of oak and maple leaves, amid pillars of sturdy young trees whose autumn dress of red and gold flashed in the slanting rays of the October sun, beneath a roof of azure sky, more than one thousand people sat to behold a pageant of the forest. The proscenium arch was the rich green of young pines. Back stage, the river sparkled and purled over smooth gray rocks. It was a setting of Nature enthroned; humankind insignificant beside its simple, wondrous beauty.

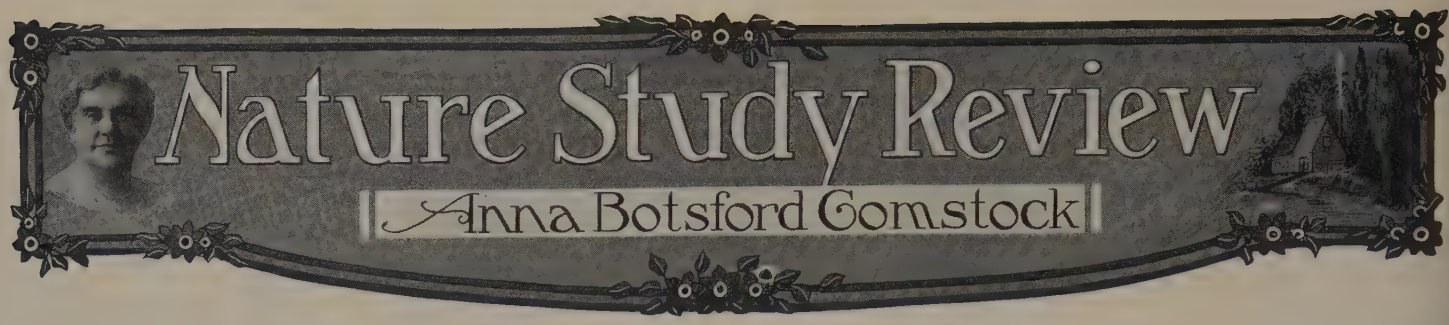
The occasion was the transfer to the State of Connecticut of a part of the People's Forest at Barkhampsted, Connecticut, on October 4. Bought by the contributions of the people through the Connecticut Forestry Association and the State Forestry Department, several hundred acres were turned over to the governor, to be held in trust by him and succeeding governors for the people, who are themselves the state.

This young stand of mixed growth is now dedicated to the memory of those trees that fell before the axe and to the hope that the lesson of denuded acres has been learned. The forest represents the forward-looking action of the people, taken by the people and symbolizing a vision for the future when the forests will be grown to serve for the people as storehouses of timber and as playgrounds.

To dramatize the meaning of the forest, the dedication and presentation was opened with a pageant of the forest. In the prologue was disclosed the forest primeval, each actor representing a tree. They stood for the forest, sheltering the hunted and the hunter, with all life attuned to them. But the three fates spun and snipped. The white man came. The Indian braves, refusing to heed the warning of their chief that they were forfeiting their lordship of the forest, bartered with the newcomers, exchanging tall trees and land for guns, trinkets and firewater. Came the woodsman with his axe and the passing of the red man. Came the destruction of the forest, with the withering away of brooks, the drying of springs. Came the leaping red wolf of fire, given battle by the ranger and the forest guard. And finally came the hope of the future, a people aroused to the need of the forest for their play and their prosperity.

TELLING THE STORY OF THE FOREST

Some of those who took part in the pageant at the presentation of the first unit of the Connecticut People's Forest to the State.



Sky Nature Study

The child's natural interest in the stars has been long neglected in the schools for various reasons, none of them good. Now and then a born teacher introduces it as a by-product of the daily routine. We had one such in our youth in a rural school, and his personality and teaching are still vivid and happy memories.

One evening in a great manufacturing city we were having a conference with working girls; among other things we had talked about the stars. As we passed out of the building the Pleiades were directly before us, and we explained, "That little, misty group of stars contains but six that we can count with the naked eye, but there are really about three thousand of them, so far away that it takes their light six hundred years to reach us." Just then a ragged urchin hidden in the shrubbery darted out, detained us with two eager hands, and said, "Lady, tell *me* about those stars." So we stopped and gave a lesson on the Pleiades and answered several alert questions; and then back into the bushes darted the questioner. The episode afforded food for thought.

This year is particularly favorable for beginning star study. The planet Mars has been talked about and written about and pictured in all the newspapers, and it is easy to step off the earth to our nearest neighbor and thence out into space. The earlier the child begins to see and in part understand the beauty and wonder of the heavens the greater will be his thought, the greater his reverence for the Divine Power that holds the vast universe in place and in order, and the happier he will be on his own little planet. November is a good month for beginning star study because darkness falls before the children's bed time and they are thus able to make their own observations.

Little children are greatly interested in the stars, and we have in our possession a star book made by a child in an early primary grade. The first page has gilt stars pasted on to show the Big Dipper, the North Star, and the Little Dipper. Another page shows Cassiopeia's Chair, and another Orion, and another the Sickle. The teacher, of course, gave the directions for pasting the stars on in correct form, but the children did the work and thus learned the appearance of the constellations. The teacher told them in what directions to look to find the constellations, and each day there was a little talk by the pupils about the ones that they had found; and thus others were stimulated to observe. The teacher read or told the myths of these constellations, which added to the interest. She also explained that each star that they saw in the sky at night was a sun of the same nature as our own.

We have also had the privilege of inspecting some seventh-grade work of the same character but far more advanced. Here the work was done under a teacher of music and literature, who believes with all her heart that the child's mind and interest should expand natureward. In this case the pupils made beautiful charts of white stars on blue paper. The mythological figures were outlined in Chinese white, and the stars were pasted on to show just where in the figures they occur. A dozen of the chief constellations were thus shown. In addition, there were cut and pasted charts showing the relative sizes of the planets, the mechanics of an eclipse, the phases of the moon, Saturn with his rings, and the procession of the seasons illustrated by showing the part of the earth reached by the sun's rays at the various equinoxes. All of these many charts were done with the precision of good workmanship, and each one was a thing of beauty as well.

Discussions Are Good

In a certain school a leader in one of the study groups of a fourth grade made the statement that all life depended upon the sun. This statement was at once challenged. To maintain his point, the leader consulted his teacher as to methods of proving it, and she patiently showed him how to trace back to the origin any form of life that he might choose: the owl eats the songbird, and the songbird eats the caterpillar, but the caterpillar eats the leaves of a plant, and without sun the leaves cannot grow. It was great fun, and the ingenuity of the entire group was exercised in finding the links in this life-chain.

After this discussion a boy made the statement that at least employments and industries were not dependent upon the sun, dressmaking, for instance. However, the material for dresses must be cotton, or linen, both the products of plants, or woolen and silk, from creatures that live upon plants. Well, take the auto industry. Surely there was nothing in that that depended upon the sun. However, it was soon concluded that part of the auto is wood, and trees cannot grow without the sun; a part of it is leather, which was once the skin of a creature that fed upon grass, while the coal used in the shops and the gasoline for the cars were both products of plants that grew with the help of the sun ages ago. Well, bricklaying—how about it? That was quickly disposed of, for the bricks, made of clay, were dried in the sun in tropical lands, and in kilns in colder countries; but the kilns were heated with wood or charcoal, both the product of trees. Thus the discussion grew in interest and in scope, and the born teacher stood watchfully by and smiled to see her pupils so eagerly educating themselves.

Hints to Teachers on Nature Subjects

By ELIZABETH K. PEEPLES

Instructor of Natural History, Washington, D. C.

This discussion of articles in the Magazine, together with hints to teachers on how to use them in their class work, is proving most helpful in Educational Work

The Tale of The Tusitala If you teach any grade above the fifth, let your reward for work well done this month be that the deserving pupil shall have opportunity in school hours to read for his own pleasure "The Tale of the *Tusitala.*" It will inevitably strengthen his ardor as a Nature lover, and may send him forth on voyages of discovery in the home neighborhood.

* * *

Jack Frost in the Orchard "Jack Frost in the Orchard" is a good subject for the General Science class. The study of fruit trees before and after a frost, and the effect upon the crop is a practical exercise in orcharding. To learn what frost is, the cause of frosts which injure crops, the places liable to frost, and the factors determining the dates of destructive frost is an equally practical study of the weather, and one which calls attention to the valuable service rendered the country by the U. S. Weather Bureau. On the mechanical side there is opportunity to experiment with air-mixing fans, smudge pots, orchard heaters, and alarm thermometers. The topic so briefly outlined in this article might profitably be pursued through an entire school term.

* * *

Why the 'Possum Thrives Nature's fundamental laws can best be taught children through concrete illustrations. The 'possum is a striking example of the survival of the fittest. Teacher and class may be forced to admit that his methods are tricky, but if not ingenuous, he is unquestionably ingenious. To look at him one would never guess his cleverness. Here again is a lesson—the mistake of judging altogether by appearances. The teacher will find even the little folks already acquainted with him through their animal story books. Pictures and article furnish excellent lesson material, and the children should be asked to write compositions about the habits of this interesting animal.

The Evening Skies in November This month's article on star study presents the needed map for the November skies, and tells how to locate most easily the chief objects of interest, Cassiopeia, the Dippers, the Square of Pegasus, Andromeda, Aquarius, Mars, Fomalhant, the Pleiades and the Hyades. Interesting information regarding Mars and the apparent wanderings of the planets is given, as well as the times and places for looking for the meteors due to appear this month.

* * *

Heron Colonies The story of the wholesale slaughter of the snowy heron and the American egret for millinery purposes, though gruesome in its details, should be impressed upon young bird students. Its very horror makes it one of the strongest pleas for humaneness in the fashions governing woman's dress, and for adequate bird protection laws. A very edifying account of a visit to a "city" of black-crowned night herons in a northern location, with descriptions of the architecture as well as the inmates, is given in this article. The northern colonies of the green heron and great blue heron are likewise described. Pictures and text make a splendid bird lesson whose chief aim should be to arouse interest in the conservation of wild life. A word picture of the semi-tropical portions of Florida, Georgia and Texas with their teeming heron colonies which once numbered thousands of individuals, and another of those same haunts now so sparsely inhabited, should give the question of the need for conserving bird life tangible form in the minds of the pupils.

* * *

Bittersweet, Most Decorative of Wild Fruits Do not let this timely hint as to an effective winter decoration for home or school, nor the tempting charm of the brilliant red-orange fruits cause us to forget that bittersweet belongs on the list of wildflowers and fruits which may be picked *in moderation.* Take a few branches, cut cleanly off close to the main stem, but leave plenty to insure continued contribution to future autumn landscapes. Children should learn to know this beautiful berry. Older classes may study its structure in some detail.

* * *

Billy, the Badger A lesson on the badger in any school in the United States plains country from Indiana west to the Sierras seems particularly fitting, since this is the region he inhabits: but wherever he may be found in a zoo, he is no less interesting; and lacking the live creature, the pictures illustrating this article will prove sufficient for the purpose. The last page of the article contains general information regarding badgers, such as the teacher will need in her preparation of the lesson. The remainder is an animal story of rare delight, which should be read to or by the children. Such a story, valuable either as a preparation or as a supplement to the lesson, may prove of especial help in arousing interest in the subject to be presented, and affording background for the ensuing discussion. In case the class is sufficiently well supplied with copies of NATURE MAGAZINE to warrant mutilating one, the badger pictures, like many others appearing in the publication, make a truly worth while addition to a Nature scrap book. Compiling such books will be found a popular and profitable project.

* * *

The Turkey and His Ancestors Thanksgiving is the psychologic as well as the gastronomic moment for turkey. Rural schools will have no difficulty in finding live material, close enough to be visited in its native haunts, or which may be brought into the classroom. But though her problem is harder, the city teacher need not despair. If her suburban friends or those of her pupils have no strutting gobbler which they will transport in their automobiles for a day's visit in the schoolroom, poultry dealers, like most business men, are apt to be gen-

erous toward educational needs. They have been known to lend the necessary crate as well as the bird for school use. History and geography are closely linked with this Nature Study lesson. Ample background in all three lines is furnished by the text and illustrations.

* * *

The Japanese Beetle Here is material in plenty for a striking lesson on an injurious insect. The introduction of the Japanese beetle, its life cycle, its almost magic increase in numbers, and the account of the war being waged against it constitute a history which is similar in marked degree to that of many of our insect enemies. If specimens of the beetle and of plants injured by it can be procured, use them in addition to the pictures. The chart showing the different stages of the Japanese beetle throughout the year is a new and clever way to make graphic the life history of the pest. Similar charts showing a year in the life of other insects may be made by the pupils with great profit.

* * *

Indiana Mends Her Fences Lessons in forest conservation need concrete illustrations to give them force. The wasting of Indiana's forests, and the effort the state is making to fight its way back to somewhere near its original wooded wealth is such an illustration. In using it make the forester the flesh and blood individual he is in the article, as his enthusiasm and devotion are typical of the profession, and make a strong appeal to children. Should there be a forester in your neighborhood, invite him in to teach the lesson in his own way.

The Devil Fish A not unimportant function of Nature Study is to correct ignorant prejudice, and to establish habits of just judgment based on actual knowledge. Many beneficial creatures such as bats, toads, and most snakes have long been objects of ignorant persecution. The octopus, so long maligned as man's enemy, and libelously called "the devil fish," is in reality a retiring creature possessed of unusual interest in matters of anatomy and habit. A study of the creature's structure from the photographs reproduced, and if possible from a museum specimen, may be truly fascinating if teacher or pupils be ready to supply such information as the text affords. Few protective devices are more entertaining than the "ink screen" of the octopus. The same may be said for his method of swimming.

Bucky, Waif of the Forest Fire

PANTING and exhausted, his little legs too weak even to hold up his slender body, Bucky was found in a woods-road ditch. Singed hair on one flank told what horror he had lived through at the end of his first three weeks of life. By dint of courage egged on by fear he had just made the road where the blaze that swept eight hundred acres had been stopped. Once carried to the nearest farmhouse, Bucky made friends with the family hunter dog, and nursed at great rate from the nippled bottle brought down from the attic.

County Game Protector Faust heard of homeless Bucky. He heard that the zoo at Scranton was looking for a young deer boarder, so the little speckled orphan found a home. Now he is the pet and pride of the zoo, safe from the flame born of some careless camper's fire, some thoughtless smoker's cigarette stub, or torch of those remaining unfortunate people who believe in "burning out the woods to kill the bugs."

Indiana Mends Her Fences

(CONTINUED FROM PAGE 302)

which C. C. wrote and which allows classification of land upon which there is a stand of trees, or upon which the owner agrees to plant trees, at one dollar an acre at the local tax rate. No cutting tax is levied.

"Why," said C. C., "there's one old fellow over here in the next county who's lived seventy years and has just put his land under classification. Says he's going to live to see it produce a crop. We've got to produce a timber crop and the best way to do it is to encourage it the most we can. That's what we do in this law."

Finally, from sheer hopelessness in attempting to combat the missionary enthusiasm of C. C., we gave up arguing points in the law. Having argued at length we hated to admit he had "sold" us his law as the law for Indiana, but he did.

So that night we slept, cooled by a breeze from the forest reserve. We had seen a serious and sound effort on the part of a state to begin to fight its way back to somewhere near its original wooded wealth. More and more people are hearing of this effort in the state. More and more passing autoists, going along the more passing autoists, going along the Louisville-Indianapolis road, stop to visit and be convinced. The State Forest, if it does nothing else, is growing as a monument to what once was and what may again be, at least in part. But it is accomplishing more than that.

New Park in New York

Jutting out into Lake George, a heavily forested peninsula known as Tongue Mountain has been acquired by the State of New York as a State Park. With a height of 1,500 feet above the lake level and separating the Narrows and Northwest Bay, this section is one of the most beautiful in the splendid setting of Lake George. The original purchase includes 5,600 acres, obtained for $130,000. It is planned to build a scenic highway through the growth of virgin spruce and second growth hardwood to the lake.

Salting the Chigger

Common salt moistened with kerosene is the remedy suggested by Prof. Alfred A. Hansen, of Purdue University in commenting on the article on this harvest mite in the October number of NATURE MAGAZINE. Iodine is a help for treating the chigger, he writes, but he has found that the salt and kerosene mixture rubbed on the bite as soon as it appears gives the quickest relief. Farmers in southern Indiana use this remedy, Professor Hansen says, and adds the point that the chigger usually enters the flesh near some place where the clothing binds the body.

Fish and the Ballot

No mackerel, cod, trout and salmon will step up to the polls in California on election day to have their names checked and to mark their ballots. Neverthless there are going to be ballots cast for them on the initiative measure which seeks to prevent the building of the 250-foot dam in the Klamath River, eighty miles from the ocean. This dam will stop the run of the fish up the river and spell their end, for no fish ladder has been discovered to get them over such a height. The fight in California is being watched by other western states, and Oregon, with a similar issue a possibility in the Columbia River, is particularly interested. Fish conservation is at stake.

"Tree Toads" in Winter

Cold November days and even the early snows of December fail to discourage the Hylas, or "tree toads," according to C. P. Russell, Park Naturalist of the Yosemite. Most amphibians with moist skins vanish in the first weeks of freezing weather, but Mr. Russell has heard the melancholy c-r-a-a-a-k, c-r-a-a-a-k of this hardy amphibian after snow fall and crisp nights. It moves him to wonder why the sticky disks with which the Hyla clings to his support are not congealed into ice lumps and his very skin crackled into flakes.

A SHEEP cabin, buried in the snow up near the timber line; snow-shoeing across the crust in the upper woods country, this is the setting of a fascinating story told by Will C. Barnes, of the United States Forest Service in the December number. It is called "On Game Patrol," and tells of protecting the elk, moose and mountain sheep from vandal trappers and "tooth hunters."

Protect the Bobolink

In an order issued in January, 1919, the United States Biological Survey permitted the killing of bobolinks on the ground that they were "seriously injurious to the rice crop of the Carolinas, Georgia and Florida." In a letter to the government bureau, Winthrop Packard, secretary of the Massachusetts Audubon Society, points out that rice growing has now left these states and that only seven-tenths of 1 per cent of the rice in the country is grown along the route over which the bobolink migrates.

"Bobolinks have of late years become increasingly rare because they are so shot up in their fall migration," Mr. Packard says. "Here in Massachusetts we are seriously disturbed about this. Our state does everything possible to protect them, yet we lose our favorite birds because they are so ruthlessly killed from the northern limit of New Jersey to the southern tip of Florida. Massed in migration, they must run the gauntlet of half a million guns for a distance of 1,200 miles. No breeding stock could stand this. We respectfully urge you to rescind this order."

"Ellis Island" for Trees

Opinions may differ about immigrants and quotas, Nordics and Latins, but the Government has solved the handling of its tree immigrants without congressional debate. The Forest Service has set about establishing several arboretums where alien trees are sent to prove whether they can become good Americans. Some 75 immigrant species have been planted in such an arboretum at Wind River, near Portland, Oregon. They are being carefully watched by the Pacific Northwest Forest Experiment Station. Some trees have proved thrifty immigrants with a disposition to prosper; others have not found the soil and climate to their liking and have failed to "assimilate," as the specialists in social problems put it. Besides being a valuable forestry experiment, there exist in this manner of handling alien trees some rather sound ideas for handling our alien arrivals. The analogy is fascinating to think out.

A Baffled Canary

Alaska, with its twenty-four-hour days, is disconcerting enough for a time for the human of the species, but it likewise upsets our fellows in the nature world. Miss Flora L. Bradford, of the American Red Cross in Alaska, writes of an experience that baffled a canary in the northern clime. One of the workers had one of the little yellow chaps sent up from the States to keep her company. For two days it refused to settle down and persisted in singing merrily during the entire day-lit night.

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Poppy Is Legion Flower

In an article by Prof. A. A. Hansen in the June number he stated the daisy was the official flower of the American Legion, but Philip Von Blon, editor of the *American Legion Weekly,* informs us that the action of the convention at Kansas City adopting the daisy was afterward rescinded at the Legion's convention at New Orleans and the poppy adopted. The resolution taking this action follows: "We recommend that this convention officially adopt the red poppy of Flanders' Fields as heretofore adopted by the American Legion Convention at Cleveland, Ohio, as the Memorial Flower of the American Legion. Such recommendation is made for the reason that the poppy symbolizes the bloodshed of the saviors of our country and each year springs up to mark the last resting place of those who made the supreme sacrifice."

Credit Where Due

In an item published in this section in the October issue, mention was made of a discovery for chemicalization of alkaline soil to produce sufficient acidity to strengthen the growth of rhododendron and other acid loving plants. Credit for this discovery was given in this note, which was taken from information in the daily press, to Dr. Edgar T. Wherry, senior chemist of the Department of Agriculture, when the credit was really due to Dr. Frederick V. Coville, botanist of the department. Dr. Coville discovered that treating ordinary neutral or alkaline garden soil with the chemical substance aluminum sulphate would render it sufficiently acid to support plants prospering in this type of soil.

Stopping the Leak

Two-thirds of the timber cut annually from the forests of the United States are lost in the processes of conversion and through inefficient use! This is the startling fact that has moved Henry C. Wallace, Secretary of Agriculture, to call a National Conference on Utilization of Forest Products in Washington on November 19 and 20. One-third of this present loss can now be eliminated, another third can be likewise saved by continued research and prevention. It is to this end that the conference has been called. Representatives of forestry associations and lumber organization, of conservation societies and wood-using in-

dustries and all organized and allied interests will be represented. This conference is of highest importance in the great task of conserving our forest resources. The members of the American Nature Association and the American Tree Association will be represented at the conference by various of their officers, and Mr. Charles Lathrop Pack, president of both associations, has been asked by Secretary Wallace to cooperate with him in the work of the conference.

Another Bad Beetle

Enemy to the growing table bean, the Mexican bean beetle has challenged the Bureau of Plant Industry of the Pennsylvania Department of Agriculture. Gradually working his way north, this destructive insect has been found recently in two counties of the Keystone State. To check him, bean growers are advised to burn all old beanstalks and vines to destroy larvaæ, pupæ and eggs, or to plow the plants under as soon as the crop has been harvested and before the beetle has had a chance to reproduce. The State Bureau is offering full particulars about this bad beetle's invasion and advice on how to receive him.

A Striking Bird

As large as a crow, with a flaming red crest and long neck, the Pileated Woodpecker is an amazing and beautiful bird. Flying at dusk, his silhouette is like a heron, his broad wings, by day patched with white, carrying him speedily through the air. Living in the oaks and cottonwoods, this woodpecker, like his smaller brothers, lives on insects. He raps upon the limb where he is seeking a meal more loudly than other woodpeckers. C. P. Russell reports seeing a pair of these interesting birds in the Yosemite National Park every month in the year for the past four years.

It Is a Wise Father

The following very interesting observation was made by Laurence B. Fletcher, of Cohasset, Massachusetts: "Sunday, July 20, I observed a male cowbird feeding a young cowbird with bread crumbs. The young bird fluttered its wings as feeding birds do. This feeding continued intermittently during the day, and from all observations it certainly looked as if the male was particularly interested in this young bird, and, so far as I could see, recognized it as its young. Regarding this last observation, as the Scotchman says, 'I ha'e ma doots.' The cowbird

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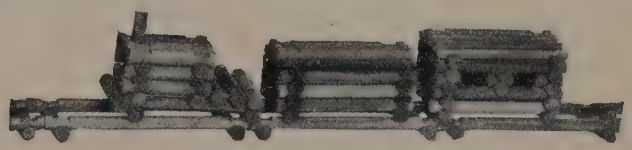

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is a gay Lothario or a rank polygamist, according to the viewpoint. His wives or paramours sneak about like 'thieves in the night' laying eggs by stealth in the nests of strangers, in which their young are reared. It is indeed a wise father who would recognize his children under such circumstances." Nevertheless Mr. Fletcher may be right. He has presented a problem for the psychologist.

Saving the Seedling

There is a valuable tip to tree planters in the conclusion reached by E. F. McCarthy, sylviculturist of the United States Forest Service, that the seedling of the yellow poplar needs plenty of light and moisture to prosper. It has been found that the seed itself germinates easily, but that the young seedlings are likely to suffer an extremely heavy death rate if there is a smothering leaf cover or a lack of light due to shade of older trees, and this shade of predominant trees is one of Nature's methods of preventing a too prolific growth of various vegetation.

Reclaiming the Swamp

In northern Minnesota, Wisconsin and Michigan there are some nine million acres of swamp land. Much of this is believed to be valuable potential forest land, and Raphael Zon, director of the Lake States Forest Experiment Station, is setting about to prove it. Excess water is to be drained, although the swamps are not to be dried up because they would become peat bogs of high-fire danger. Director Zon believes that swamps drained to the proper water level can be then able to double and even treble the volume of wood grown on them.

"Porky" Not a Bad Sort

Through more emphasis on the wealth of Nature in our National Parks, many visitors have learned that ancient beliefs on animal peculiarities do not hold true in fact. Take "Porky," for example, who is reputed to have the uncomfortable habit of throwing his quills. The porcupine, as a matter of fact, is a peace-loving fellow. His quills are protection against an enemy, who chews them into his own mouth, or who is severely wounded by "Porky's" threshing tail. There seems to be no foundation for the belief that porcupines curl up and roll down hill to spear enough dry leaves for a nest.

A Vanished Family

Fifty years ago few had penetrated the wilds of the Yosemite, and those few found the splendid big horns, or mountain sheep, monarchs of the Sierra heights. Today they are gone, most of them the prey of the rifles of miners who came (and went) in the rushes of 1857 and the seventies. Although these sheep lived on desolate high crests, they were shot and became an extinct race. Today in the Yosemite the thrill of seeing one of these hardy wild relatives of our wool-producers has been supplanted by the excitement of discovering a skull. Several have been found, but the hope is held out that some more sheep may invade the park from the south, recreating in some part the scenes of the past.

A Wren Solomon

Edward Howe Forbush passes on this tale of how a wren worked out the eternal triangle satisfactorily. He had two wives, both living under the same roof of a birdhouse. His respective spouses built nests in different corners and raised broods, while father wren distributed his attention equally, assisting in the respective tasks of both his households. Meanwhile his wives were on the best of terms, calling on each other and showing interest in each family group. Mr. Forbush remarks that, after experiences with the banding of house wrens, "we can believe almost anything of a wren."

How the Fire Behaves

In order to discover just how forest fires behave under varying conditions of soil, moisture and planting, the Southern Forest Experiment Station at New Orleans sets its own fires on experimental areas. Small sections are set off for their variety of growth condition and are deliberately burned under differing conditions. From these studies very definite information is being gathered on how the forest fire behaves itself. Only a start has been made on this all-important question, however, and Director R. D. Forbes sees another decade of study still ahead.

Bizarre Hummingbirds

Imagine four hummingbirds "dancing a quadrille on the ceiling." This is the experience that Mrs. Eleanore Morgan, of Northeast Harbor, Maine, had as a result of birdbanding of these birds. One of five banded kicked off its band, but the other four she found in the unorthodox position on the ceiling. The only way that she discovered to get them out was to place a perch just below the ceiling and lower it gently to the window when the birds had alighted on it. She says that the hummingbirds in her room always fly up instead of down.

Marmots and Chocolates

Western marmots, or woodchucks, are acquiring new tastes as a result of association with visitors to the Yellowstone, E. J. Sawyer, the park naturalist, reports. Around Canyon Camp the marmots fraternize with the tourists, sampling crackerjack, chocolates and other sweets and dainties fed to them by hand. One day Mr. Sawyer varied the program and fed them crackerjack from his lips.

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A Pacifist Cat

It is generally believed that a mother cat with a new litter of youngsters abandons her mouse-hunting activities for a time, even though she has a household reputation as an excellent mouser. Mrs. C. A. Shulz contributes an interesting sidelight on this in telling of her cat, who had both the litter and the reputation. The mother cat appeared with a mouse in her mouth, seemingly disproving the belief. The next day, however, behold the mouse, alive and apparently happy, in the box with the kittens and the cat! Mrs. Shulz admits that in the interest of science she should probably have let the mouse live on in its adoptive family, but her housewifely instinct prevailed. She adds the conjecture that pacifism is affecting the feline tribe.

Successors to the Chestnut

Sweeping south, the chestnut blight has wrought havoc and made gaps in many eastern forest areas. Attempts to introduce varieties of Chinese chestnuts, supposedly immune to the scourge, have met the problem of rigorous weather. C. F. Konstian of the Appalachian Forest Experiment Station has been investigating to discover what trees succeed the going of the chestnut. In some sections where the blight worked years ago, the chestnut oak has come in. In other localities the neighboring trees have spread their crowns now that the competition of the chestnut has gone. The larger gaps are found to support young oaks, white ash and hickory, with some natural growth of pine.

A New Beverage

Reminiscent of the Italian *table d'hote* dinners regaled with red wine is this experience contributed by William M. Harlow, a ranger in the Yosemite National Park. He discovered that every night after his lantern had been lighted, a half dozen or more daddy-longlegs were attracted by the light. One evening one of these fellows found the red ink well on the table, and was soon discovered straddling the pool with his eight slender legs. Cautiously he tasted the red ink, and then, evidently finding it to his liking, lowered his body so that he barely touched the surface, and remained drinking it for several minutes. He was joined by another daddy-longlegs who seemed bent on "jumping the claim," and who succeeded in also having his taste from the ink well. The following night the ink well was not

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patronized. The succeeding night, however, along came five daddy-long-legs, all of them eager to taste the newly discovered liquid. Their forty legs got tangled up when they all tried to drink at once. After considerable jostling about they all seemed to have gotten their fill, and departed, but Ranger Harlow still declares that it is a mystery whether the red ink agreed with the daddy-longlegs' digestions or not.

Wrens vs. Sparrows

English sparrows have the reputation of being quarrelsome and combative, and of driving other birds from the neighborhood, but a wren in Schenectady, New York, has shown that it knew how to cope with the situation. Early in the spring a pair of wrens selected one of two bird-houses in a small orchard as a summer residence and nursery. The second box, on an adjoining tree, was probably avoided as the entrance was so large. All went well for about three weeks, and then the second box was claimed by a pair of English sparrows. Straw and feathers were carried into the box by the sparrows, and preparations made for a nestful of eggs. The wrens thought otherwise, however, and in the absence of the sparrows one of the smaller birds industriously removed practically all of the lining from the box, merely dropping it out of the entrance. The outraged sparrows raised a cry on their return and soon about ten of their kind collected, all loudly chirping. The wren was not attacked, however, and neither was the nest completed.

Elements of Forestry

"The continued progress and expansion of the conservation movement can be assured only through cumulative popular education, which must reach every group and class, and must pay particular attention to children in the schools and to students in agricultural schools and colleges," declared Franklin Moon and Nelson Courtlandt Brown, Dean and Professor of Forest Utilization respectively at the New York State College of Forestry, in bringing out a new edition of their forestry textbook, "Elements of Forestry," published by John Wiley and Sons, Inc. With the admirable background of the first edition, published ten years ago, the authors have brought statistics and data up to date. The experience of the World War, which uncovered many things and stimulated much discovery, made revision advisable. In the last decade forest policies, as applied by the Federal Government and the state governments, have developed considerably, and new chapters are devoted to this phase of the movement. The volume contains a

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The Why of Growth

"Growth" is the brief and entirely descriptive title of a comparatively short but remarkably complete volume by G. R. deBeer, of the University of Oxford, brought out by Edward Arnold and Company, of London. Proceeding from the viewpoint that growth is a "phenomenon of universal occurrence and importance," but that it is only since the introduction of the experimental method that much has been known about it. Mr. deBeer takes a few simple and fundamental biological principles and proceeds to show what growth is, what it does, and how it does, in an admirably simple and instructive manner. He covers the process of growth under the two general heads of increase in size and increase in complexity of structure, taking up both the animal and plant world. Perhaps the chief value of the book lies in its simplicity of presentation, and it certainly provides an adequate introductory volume to a field not yet widely touched.

Games for Outdoors

With the rapid development of out-of-door recreation, stimulated by recent national activities, "Games and Recreational Methods," compiled by Charles F. Smith, of Columbia University, and published by Dodd, Mead and Company, New York, should prove a valuable handbook for leaders in this work. The book is designed for use by "clubs, camps and scouts, and is pictorial, with 442 illustrations and diagrams. Throughout the volume the underlying theme is "the play way of teaching," a distinctly sound means of interpreting the outdoors to the younger generation in a way in which they will both appreciate and value it. This idea is applied in one section to games and methods by which nature lore can be taught effectively, and another chapter is devoted to simple tree identification. The range of Mr. Smith's compilation is wide, running from the gymnasium to the intricate subject of knots and how to tie them.

Western Trees

In his book "Western Forest Trees," published by the World Book Company, James Berthold Berry, M.S., says: "The trees are divided, by lumbermen, into two groups—the 'softwoods' and the 'hardwoods.' In early days the former term was applied principally to the white pine and the latter

to white oak. At present, however, each group includes woods of both hard and soft texture. The botanical terms 'evergreen' and 'deciduous' are nearly as inexact, since some of the trees of each group drop their leaves at the end of the growing season, while others retain their leaves for more than a single season. From the standpoint of the woodsman, the terms 'needleleaf' and 'broadleaf' are much more definite, the needle-leaf group including both needle-like and scale-like leaves (the pines and their allies) and the broad-leaf group comprising the so-called 'hardwoods,' or deciduous trees. Each kind of tree (species) possesses certain definite characteristics by which it may be distinguished from others. The characteristics most easily observed are those of form, bark, foliage, branching, leaf and bud."

Robin's Roost

"For some time it has been known that robins congregate in numbers to spend the night. Mr. Bradford Torrey has told us of a large roost in New England. The place was used only during summer after the young of the first brood were old enough to be upon the wing and fly thither with the adult males. The females at this time were busy hatching their second nest of eggs," says T. Gilbert Pearson in his book, "Stories of Bird Life," published by World Book Company, 2126 Prairie Avenue, Chicago. "A swampy woodland was the spot selected, and here the birds assembled each night during the months from June to October. As he watched them entering the woods in the evening, he often counted more than a thousand coming to the roost from one direction.

"A winter roost far more remarkable for numbers than this has been described to me by a gentleman who lived near it in his youth. It was situated in what is locally known as a 'cedar glade,' near Fosterville, Bedford County, Tennessee. The land there is swampy. Limestone outcrops on the surface, and the soil, thus long escaping drainage and the plow, gave opportunity for a vast growth of cedar trees. This entire tract covered an area perhaps thirty by forty miles. In all this cedar country, robins came in immense numbers during the winter months to feed on the cedar berries."

Welding Metal

"Welding consists in joining two pieces of metal by heating one or both to such a point that when they are placed together a continuous metal results," says Reginald Scott Dean, B.S., M.S., Met.E., published by John Wiley & Sons, Inc. "If two pieces of iron are hammered together at ordinary temperatures they do not weld; if they are first heated, however, a continuous metal is formed. What is the function of the heat? First, it decreases the tenacity with which the absorbed gas is held; second, it allows crystal growth to take place across the

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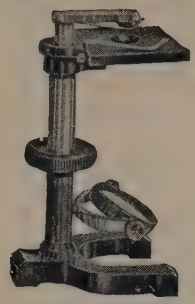

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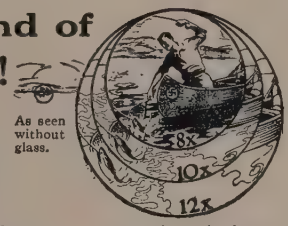

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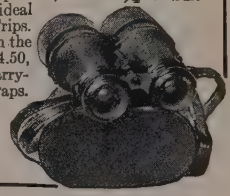

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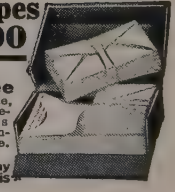

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metal-to-metal contact so formed. The second function is merely a strengthening of the weld, so that if it were not for the absorbed gas, welding could be done at room temperature."

Looking at Landscape

"There is one way of looking at the landscape that is distinctly modern; I mean by the use of photography, especially through the snapshot camera." So says Stephen F. Hamlin in his book entitled "Man's Spiritual Contact with the Landscape," published by Richard G. Badger, The Gorham Press, Boston, Mass. "This is looking at the landscape pictorially, not always to understand it, though finding pictures in it may be one of the necessary steps in the process of loving it. Hunting the landscape with a kodak is usually great fun as well as instructive, and you soon learn to notice and compare in a way the unseeing observer never knows. As a means of preserving in our personal records scenes that made an impression on us photography has no equal. We can live our vacation over again from a few pictures; but a collection of pictures is not all that we should bring back from a trip to Nature."

Out-of-Doors Cooking

"Right kinds of food, properly cooked, are as essential to life as in the city. The content of the camp larder is too commonly based upon the fallacy that camping develops a cast iron stomach and that the food you eat doesn't matter so long as it can be transported comfortably and there is plenty of it. There is just enough truth in this belief to make the fallacy plausible," says Elon Jessup in his book, "Camp Grub," published by E. P. Dutton Company, New York City. "Out-of-doors cooking is frequently called an art, but it is seldom referred to as a science. In contrast to this, modern indoor cooking is usually spoken of as a science. The two backgrounds are different. Yet in each case the human stomach is the same, and while its needs may vary to some extent with different modes of life, it must under all conditions be treated essentially from a scientific standpoint. That which the average camp larder needs is a little less art and a little more science."

The Devil Fish

(CONTINUED FROM PAGE 304)

make their way down into crevices in the rocks with their tiny stubby arms, the mother leaves them to shift for themselves. Many of these tiny, soft, defenseless creatures fall easy prey to rock-searching fishes, crabs, lobsters, and the like. Perhaps it is fortunate that not all grow to maturity, for if they did the whole sea bottom, at least near the coasts, would be nothing but a writhing mass of octopi, and we should

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be confronted with a problem of overpopulation.

Some octopi grow to great size. A dead octopus was found not many years ago cast up on the beach at Nassau, in the Bahamas, which possessed arms five feet long. Its extended arms covered a circle ten feet in diameter, and the creature was estimated to weigh two hundred and fifty pounds. Occasionally, also, individuals are still encountered almost as large as this, and these could, of course, seize a man and easily hold him under the water until he drowned. But such occurrences are not common.

The majority of octopi possess bodies no larger than a clenched fist, and many are smaller still. These are quite harmless to human beings, and make the most fascinating aquarium pets, with their queer staring eyes and really graceful antics as they climb about and feed. Contrary to the popular belief they are not at all aggressive or fond of combat, and even the larger specimens, when captured, show little disposition to fight. In fact humans are their chief enemies. In the Hawaiian and other islands, in China, the West Indies, and in the cities of Naples, Smyrna, and many other places on the Mediterranean coast, the octopus is esteemed as a table delicacy.

Frost in the Orchard

(CONTINUED FROM PAGE 272)

numbers in the orchards and these are closely watched when frost is imminent. Many growers use "alarm-thermometers," which are arranged to ring an electric bell in the owner's house when the temperature falls to a certain point. Lastly, the local telephone exchanges usually cooperate by sending out a general alarm whenever it is advisable to mobilize forces against an invasion of Mr. J. Frost.

Why the 'Possum Thrives

(CONTINUED FROM PAGE 277)

about the persimmon trees on crisp, moonlit nights to test the ripening fruit, or wandering about the dew-soaked meadows in his slow, humble way. He will always be a creature of romance. Like the pretty flying squirrel who romps at night in the partitions and ceilings of old houses, like the weird barn owl whose scream in the dark makes our hair tingle for a moment, and like the little brown bat who flits about so energetically catching mosquitoes over our very heads, he is a link with the wild.

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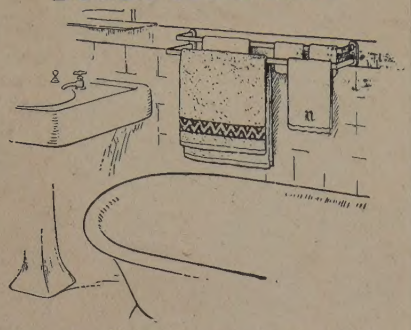

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Heron Colonies

(CONTINUED FROM PAGE 282)

varied. One wonders what becomes of the young that are annually reared in the huge nests situated over one hundred feet above the ground, but it is probable that, like their cousins the night herons, they join other colonies in the south or go to form new ones of their own. The great blue is the largest of our herons, averaging nearly four feet in height and with an expanse of wings of about six feet. It is often called "blue crane," but it can be readily distinguished from the true cranes by the fact that its neck is folded back between its shoulders in flight while the crane flies with its neck stretched straight out.

Evening Skies in November

(CONTINUED FROM PAGE 278)

visible to keen eyes, is one of the most noted groups in the heavens. The V-shaped cluster of the Hyades is scarcely less famous. It would be well worth while to turn a good pair of field glasses or opera glasses on the Pleiades. It will then be possible to see all of the eleven stars that can be seen without any optical aid by persons with exceptional eyesight, as well as fifty or more fainter stars belonging to the cluster. At least two hundred and fifty stars visible in larger telescopes are known to be true members of this group traveling onward through space together.

November, besides being the Pleiad month, is the month of meteors. Several swarms are due to appear every year in November, some years more plentifully than others. The Leonids, so called because they come from the general direction of the constellation Leo, appear about November 15, but you will have to be up before sunrise to see them because Leo is now in the morning sky. The Andromedes, which will appear to come from the direction of Andromeda, will appear in the evening hours, however, about the 23d or 24th of the month; and then there are the Taurids, several different groups appearing at different times during the month from different points in Taurus. These also will appear in the evening hours from the direction of Taurus, now nearly due east. An occasional fire-ball, which is simply a meteor of exceptional size or brilliancy that may succeed in reaching the earth's surface, has been known to appear among the Taurids, so keep an eye on the eastern heavens these crisp November evenings and you may see something of special interest in the way of meteors.

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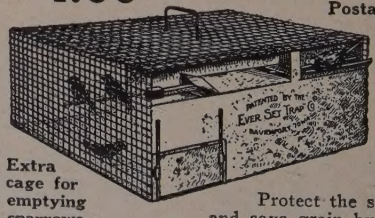

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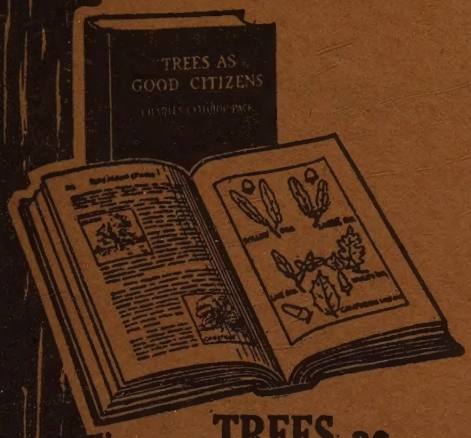

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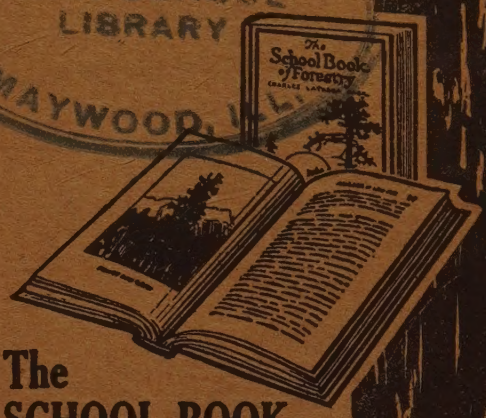

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